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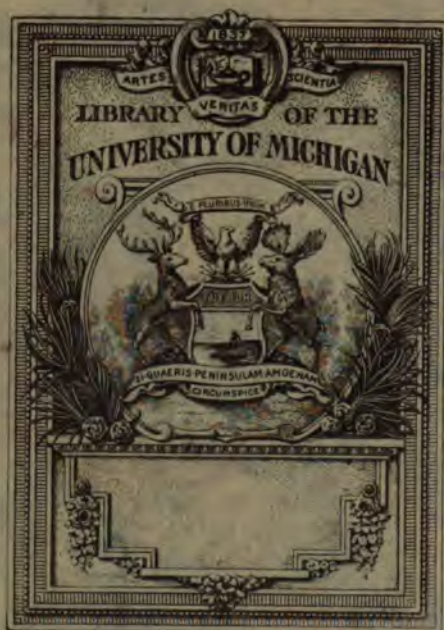
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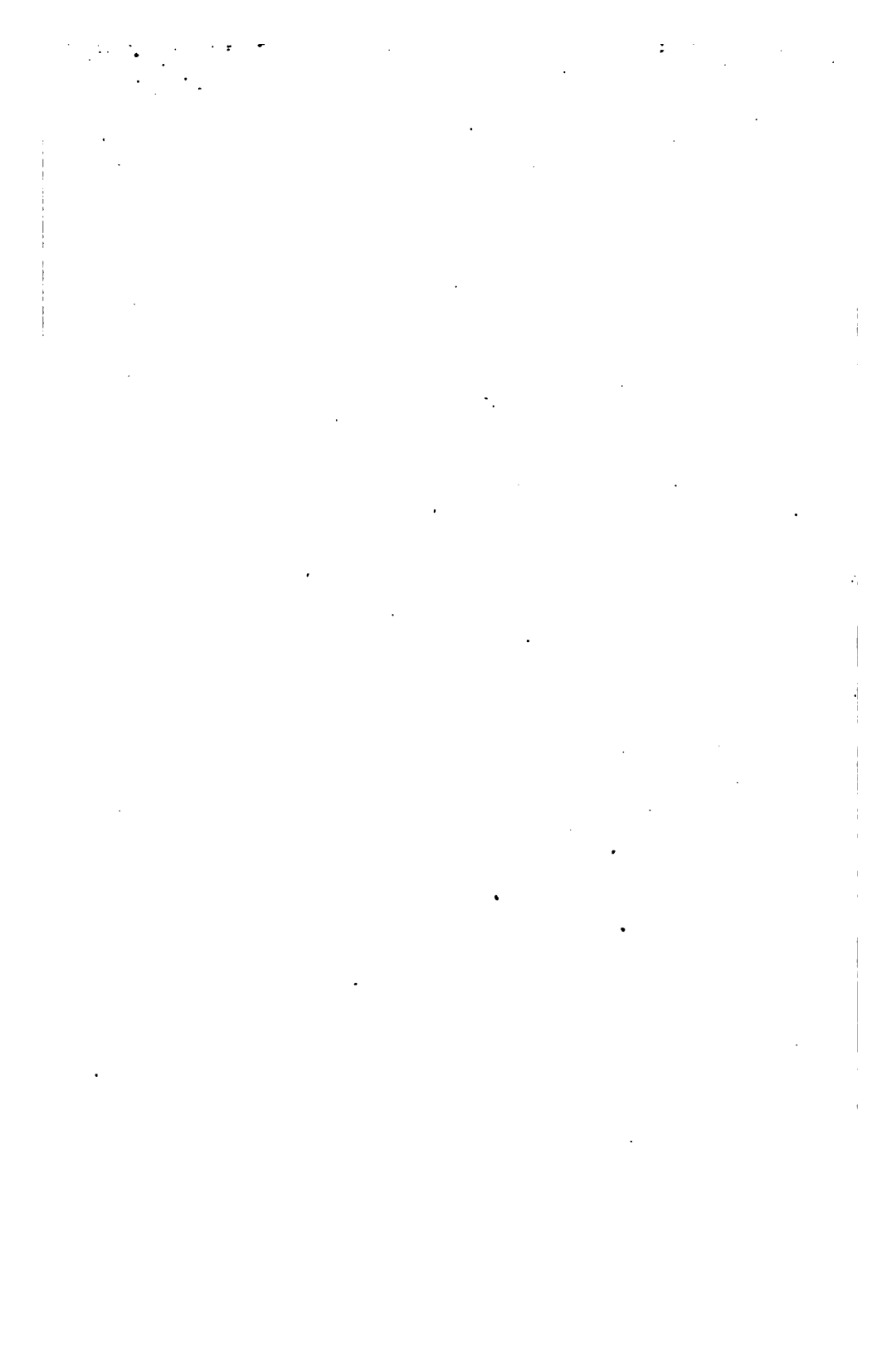
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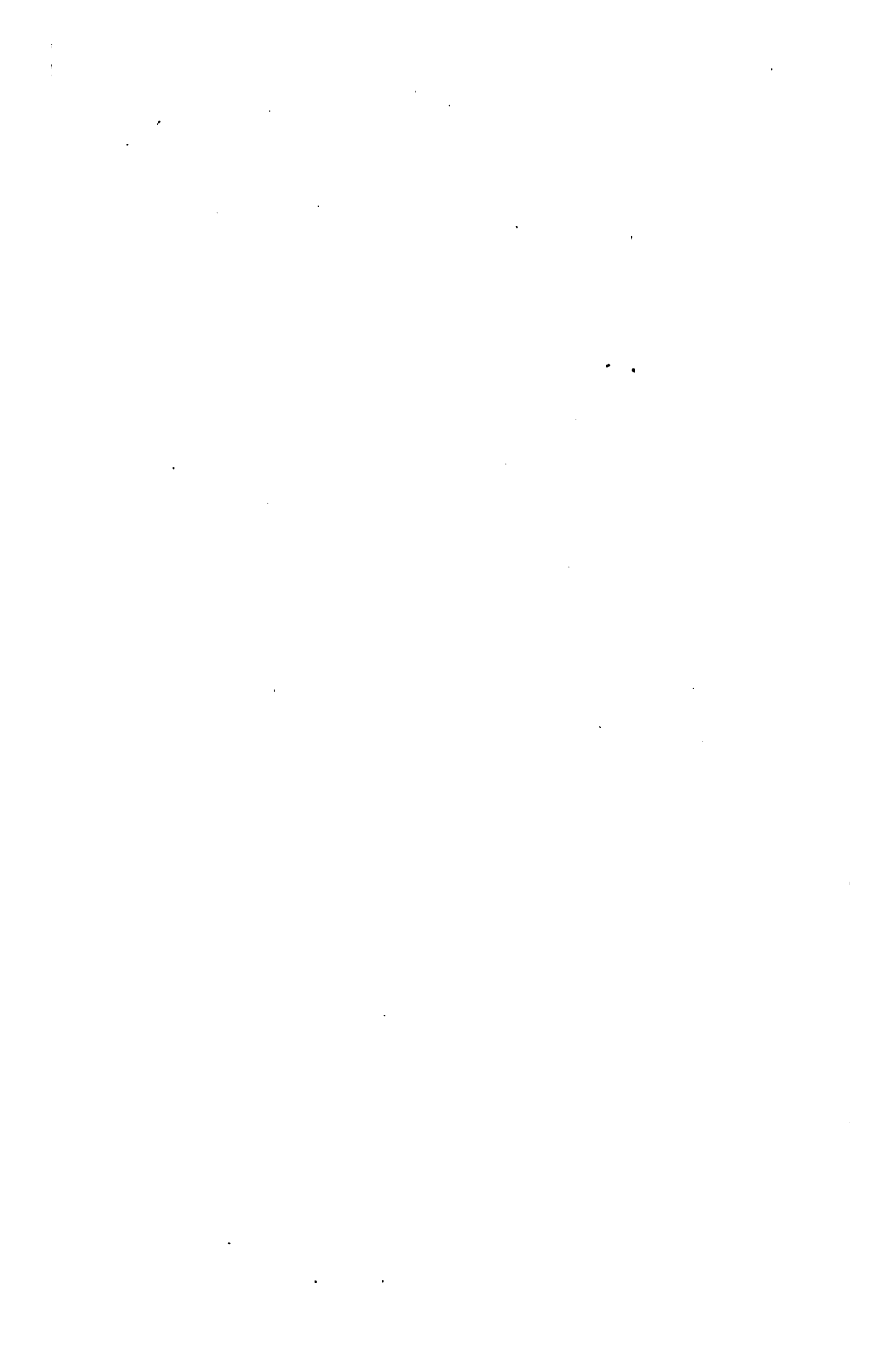




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THE
OPHTHALMIC REVIEW,
A
MONTHLY RECORD
OF
OPHTHALMIC SCIENCE.

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ERRATA.

P. 91, line 4 from bottom, for "Dr. Mules" *read* "Mr. Anderson Critchett."

P. 339, line 8 from top, for "Eyophoria" *read* "Esophoria."

P. 339, line 14 from top, for "Schlgtenda" *read* "Schlegtendal."

ON CERTAIN CASES OF VITREOUS OPACITY IN CONNECTION WITH EXCEPTIONAL CAUSES.

BY JONATHAN HUTCHINSON, F.R.S., LL.D.

I wish to record, in the present paper, some cases illustrating certain of the more rare conditions under which vitreous opacities became a conspicuous phenomenon. It is not my intention, by any means, to deal with the whole subject; but it may be of interest to introduce the cases (which are, for the most part, exceptional ones), by some brief general statements.

It will, I suppose, be generally admitted that the vitreous body usually suffers in conjunction with the retina; thus, in syphilitic retinitis especially, we frequently see the vitreous become more or less opaque. In affections of the choroid on the contrary, however extensive and long-standing the disease, the vitreous usually remains quite transparent. In most forms of iritis, whether syphilitic or rheumatic, the vitreous usually escapes, and in the keratitis of inherited syphilis, however severe and prolonged it may be, this structure scarcely ever suffers.

There is a peculiar form of insidious and relapsing iritis, which occurs in young adults, in which the vitreous suffers not exceptionally, but as a rule, its implication constituting an important fact in the diagnosis of the disease. This malady has a very peculiar clinical history, and often ends, unless a complete change of climate can be obtained, in destruction of the eyes. I have described this affection at considerable length

elsewhere, but it is necessary to refer to it here in connection with one of the cases which I am about to record.

Although, as already stated, the occurrence of vitreous opacities is an almost constant phenomenon in certain forms of iritis due to inherited gout, yet I do not think that it is very common in connection with acquired gout, or in gouty persons past middle life. A possible instance of its occurrence in this association, and with the suspicious feature of a remarkable tendency to relapse, has been under my care for several years. Its subject is a robust gentleman of active habits and accustomed to live very freely. He comes under my care once a year, or once in six months, for the last five years, always complaining of the same symptoms, of slight infraorbital aching, and the appearance of "a spider" before his left eye. From these symptoms he always recovers after a time, the treatment being a more restricted regimen, and the use of iodides, and small doses of mercury. The ophthalmoscope has repeatedly demonstrated a number of fine opacities in the vitreous, one flake being much larger than the rest. A fallacy in this case is that the patient is not only gouty but the subject of tertiary syphilis, and it is impossible to say which influence is the more important in reference to his eye.

Although I have ventured to say that opacities in the vitreous are seldom seen in connection with disease in the choroid or in association with affections of the eye from inherited syphilis, yet it must be admitted that there are exceptional cases. Thus I have before me the notes of a case in which a man named Knight, aged 18, had extensive disease of choroid and floating opacities in each vitreous. He had also a commencing posterior polar cataract. My notes do not definitely describe the retina, but speak of the case as one of choroido-retinitis, and date the commencement of the disease at 18 months. This man showed no signs whatever of inherited syphilis,

and he denied having ever suffered from the acquired disease. We should have failed in procuring any evidence as to its cause had I not requested an elder brother to attend. He had a pair of typically notched teeth, and extensive disease of the choroid in its periphery.

In another case, a girl of 13, whose sight had been failing 8 years, and who had passed through an attack of keratitis, I found numerous floating bodies in the vitreous of each eye. They were in association with extensive disease of the choroid, and with atrophy of the discs. The case may be regarded as one of slowly progressive choroido-retinal disease, consequent on syphilis. I quote these cases as decidedly exceptional, for more usually, disease of the eye consequent on inherited syphilis, clears away after an acute attack, and does not become chronically aggressive. They also confirm the observation that vitreous opacities imply implication of the retina, and do not go with choroiditis only.

The cases in which opacities in the vitreous are secondary to intraocular hæmorrhage, and of which the typical examples occur almost invariably to young men, constitute a group by themselves, and may for my present purpose be left aside, as I have to deal with cases in which there was no probability that hæmorrhage had occurred.

It may, perhaps, be a matter of doubt with some whether conditions of opacities of the vitreous can be induced by influences which simply lower the tone of the system. It is certainly a matter of every day experience, that patients may be reduced to conditions of extreme debility by various causes, without suffering in any way as regards the nutrition of the eye. On the other hand, it is a fact equally well known, that in those conditions of want of tone, induced by sexual excesses, and especially by masturbation, muscæ

are a frequent and troublesome symptom. Although, however, I have seen innumerable cases in which muscæ were attributable to this cause, I must confess that I have not seen many in which vitreous opacities could be demonstrated by the ophthalmoscope. A few, however, I have seen, and quite enough to make me believe in the relation between cause and effect. One of the most severe of these is the subject of the following brief narrative.

Wm. T——, 35, was under my care at Moorfields about 1862 for extensive disease of the vitreous in each eye; the opacity was equal in almost all directions, and gray and cloudy; the details of the fundus could with difficulty be just seen, but it was certain that there was no detachment of the retina. He could, on admission, barely make out letters of 16 J when held at 2". He said that the sight had been failing steadily for 17 years, and he himself attributed the disease entirely to the effects of masturbation. He denied having had syphilis. There were also some old corneal opacities left by an attack of ulceration in childhood; he had, however, quite recovered from this attack many years before the failure depending on the vitreous disease began. He was a pale cachectic man, and very nervous. He had been an inmate of an asylum before I saw him; and in 1864 I learnt from his friends that he had become totally blind and was again insane.

I will next adduce a case which I saw only a week ago. A lad of sixteen, apparently in most excellent health, has diffuse neuro-retinitis in the left eye and the vitreous full of filmy opacities. The problem is what can be the cause of such an affection at this age. He is moderately florid, looks somewhat older than his years, of cheerful temperament, and fond of athletic sports. Excepting chickenpox in childhood, both his mother

and he agree that he has never ailed anything in his life. He is the fifth son in a family of ten, and all are remarkable for their vigour and freedom from ailments. His circulation is a little feeble in the extremities, and he suffers mildly from chilblains in cold weather. As regards his eyes, he has with the right quite perfect sight, and with the left, in which, as stated, the vitreous is full of opacities, he still sees $\frac{20}{80}$. He discovered that his eye was dim suddenly in May last, that is seven months ago. He was reading at the time and noticed an appearance as if dust were before his eye. This appearance never quite left him, but when he was at home for his vacation at midsummer he made no complaint, and lived as usual. He returned to his college work for the autumn term and read hard. He was of active habits both mentally and physically, and successful in all that he undertook. When he returned home at Christmas his mother noticed that his left eye looked red, and on questioning him about it found that it felt hot and uncomfortable. A surgeon was consulted who used the ophthalmoscope, and found the conditions above mentioned, and at once sent him to me. The lad admitted that several times between midsummer and Christmas he had felt the eye hot and uncomfortable, but had never had any material pain in it. He was still able to read without its causing him any distress. There was no history of injury. I, of course, inquired carefully as to masturbation, but he assured me, and I think truthfully, that nothing of the kind had occurred. He never suffered from headache, only once or twice from bleeding at the nose, and he never needed aperients. The kind of discomfort he had had in the eye had never been severe, not amounting to more than a mild degree of what I have described as "hot eye." There was a history that some four or five years ago he had had what was called "ophthalmia," but it was quickly cured

by a lotion which his surgeon ordered. To describe more in detail the conditions present in the eye, it may be said that the pupil dilated well with atropine, leaving no adhesions. The opacities in the vitreous were very delicate and very numerous, their presence made the examination of the retina somewhat difficult, but there could be no doubt that the margins of the optic disc were blurred, and that over a considerable region round it the retina was hazy and grayish. Part of this appearance, no doubt, was due to the state of the vitreous, but on careful examination I felt sure that it was not all so explained, for the retina at parts more distant from the disc could be seen to be moderately clear.

I have mentioned in the above narrative all that I can think of bearing on diagnosis, excepting inquiries as to gout. On that head I obtained the following facts:— There was gout on both sides of his family, his maternal grandfather and a maternal uncle both suffered definite attacks, and his mother had been told by her medical attendant that her ailments were gouty. His father also and some of his father's relatives had suffered definitely. His father had for many years been a total abstainer, chiefly on account of this liability, and had been free from symptoms. The lad himself had never tasted any stimulants. We may fairly assume that this abstinence from stimulants had probably prevented the occurrence of more definitely gouty ailments in the family. The diagnosis of a gouty neuro-retinitis seems to me fairly well established in this case. It differs from those in the group of iritis from inherited gout, in the fact that the iris did not suffer, whilst the retina did. It agrees with them in the affection of the vitreous, and in the insidious and ill-marked character of the inflammation, also in the age at which it occurred, and, I may add, in the temperament of the individual. The youth bore a most remarkable resemblance both in build and physiognomy to a young

gentleman who was one of my most marked examples of gouty iritis, and he might have been the brother of Miss — whose case was of the same kind. These three individuals were alike in presenting a certain squareness of build, rather short stature, and somewhat heavy features. They were all rather florid, but with some feebleness of circulation as regards the extremities.

I have to add to my narrative of this case that a peculiarly jerky and unfilled pulse led me to examine his heart; and that I found a distinctly heaving impulse and a systolic bruit over the aortic valves, which was transmitted upwards. He alleged that he had never known what palpitation was, and that he was accustomed to play football without inconvenience.

I do not know that the suspicion has ever been entertained hitherto that vitreous opacities might be caused by the too long use of arsenic, yet one of the best known indications of disagreement of this drug is pricking of the conjunctiva, and general congestion and irritability of the eye. It is also well established as a clinical fact that a prolonged use of arsenic in large doses may disturb the nutrition of the skin, and cause it to become muddy and brown. For proof that it may go further than this and produce conditions almost resembling psoriasis, and that it may cause a condition of diffuse keratosis of the palms, I may refer the reader to a paper by myself in the last volume of the "Pathological Transactions." With such facts before us I would submit that there is nothing improbable in the supposition that it may disturb the nutrition of such a substance as the vitreous body. In addition to what has just been stated, we have, I think, strong support in the fact that arsenic may cause peripheral neuritis; thus it not unfrequently provokes an attack of Herpes Zoster; and it not unfrequently causes tingling and numbness in local patches of skin. In rare cases it makes

the soles of the feet quite numb, and may even produce paraplegia. Some facts published long ago by Sir Robt. Christison, in his work on poisons, are of great value in reference to its effects on the nervous system, when given in suicidal or murderous doses.* There is, therefore, I would submit, nothing improbable in the supposition that it may occasionally cause inflammation of the retina or optic nerve. I am not aware that it has ever been accredited with the production of deafness, but this is a possibility which it is well worth while to keep in mind. To return to the eye, I may say that I have seen several cases in which, after long use of arsenic for skin diseases, permanent defects of vision, attended with muscæ and opacities in the vitreous, ensue. I am not at present able, however, to put my hand on the notes of more than one, which is as follows:—

A gentleman of middle age, the subject of psoriasis, had taken arsenic, on and off, in liberal quantities from 1873 to 1885. My notes refer to May of the latter year. He came to me on account of the failure of sight; he could see $\frac{2}{8}$ with both eyes open, but $\frac{3}{8}$ with either eye alone, and barely that with the right. In the vitreous of the right there were crowds of filmy opacities, and the disc was seen only indistinctly. In the left eye I failed to make out any opacities, but the fundus had a dull, hazy appearance, especially about the disc. The patient was a healthy man, who had never suffered from any form of venereal disease; he had been twelve years married and had healthy children. The history of his psoriasis was that it began when he was at school, on his head, and that at the age of twenty-one, after an attack of scarlet fever, he quite lost it; but that it recurred with great severity when he regained his health. He did not think that arsenic ever disagreed with him, and

* See a recent paper in "Brain."

he had several times during the twelve years he used it laid it aside for six months together. It had always had a definite effect in controlling his skin disease. In January of 1885, that is four months before I saw him, he had a severe and very extensive relapse of the eruption, which came on after a feverish cold. He again took arsenic freely.

The palms of his hands, which had often suffered before, were now more than usually affected, the skin becoming hard and horn-like, so that pieces could be picked out as if from the rind of an orange. I may note in passing that I believe that this keratosis condition of the palms is not a part of the psoriasis eruption, but is usually, if not invariably, due, when it occurs in conjunction with common psoriasis, to the influence of the arsenic used for its cure.

Common psoriasis affects the extensor surfaces and the backs of the hands, and does not usually implicate either the soles or the palms. I therefore regard its occurrence in this case as proof that the patient was taking arsenic to saturation. It was whilst under its influence, and about a month before I saw him, that he began to suffer from a dull headache across the forehead, and slept badly. About the same time he noticed that his sight was failing. His first symptom was a black spot which moved about, and after this specks and a film, as if looking through an oily medium, appeared. When I saw him his tongue was furred over its whole surface, and of a peculiar lilac or light violet tint, a condition which I have often seen in those who were taking arsenic.

I am not able to give the sequel of this case, for the patient came from the country, and I have not seen him again. I advised him that he should at once, and for ever, forego the use of arsenic, and rely on external remedies for the cure of his psoriasis.

**INJURIES OF THE EYE IN THE GERMAN ARMY
DURING THE WAR WITH FRANCE, 1870-1871**

Prepared by the Army Medical Department of the Prussian War Office, with the co-operation of the same of Bavaria, Saxony, and Wurtemberg. *Vol. III. of the Army Medical Reports for 1870-1871. Berlin, 1888. Abstracted in Centralbl. f. prakt. Augenheilk., Oct., 1888, p. 309.*

This report is the most important yet prepared concerning eye injuries in military practice. Over older reports of the same kind it has the advantage that the ophthalmoscope was employed in a large number of the cases recorded. The long period which has elapsed before its publication has made it possible in many cases to record the ultimate results of the injuries received seventeen years ago.

The statistical portion of the report shows that injuries of the eye were met with in 786 cases, being 0.79 per cent. of the whole number of injuries, and 7.8 per cent. of the head injuries. Affections of vision after brain injuries were met with in 74 cases, *i.e.*, in 0.7 per cent. of the head injuries. The left eye was injured more frequently than the right; right 317, left 374, both 76. A further analysis shows that 313 injuries were caused by bullets, 197 by shells, 3 by blows, 25 by thrusts. In a considerable number of cases, especially of the bullet and shell injuries, the particular cause is not stated. The shell injuries were, on the whole, less serious than those inflicted by bullets. The eye was destroyed in 62 per cent. of the latter, in 36 per cent. of the former. The probable explanation of this difference is that the bony surroundings of the eye afford better protection from fragments of shell than from bullets. On the other hand, contusions of the eye by bullets were two in number, against 65 by shell fragments.

Classified according to the particular structures injured, the cases showed the following *percentages*:—Injuries of sclera and conjunctiva only, 3; cornea only, 7.7; cornea and iris, 5.7; cornea, lens, and iris, 9.3; cornea and ciliary body,

2.3 ; iris only, 7 ; lens with uninjured cornea, 5 ; vitreous, 3.3 ; retinal and choroidal hæmorrhage, 3 ; rupture of retina and choroid, 12.3 ; detachment of retina, 9.3 ; inflammation of the internal membranes, 15 ; changes in the papilla, 10.7 ; impaired sight from various causes, 22. In many cases injuries of the front of the eye did not destroy the organ.

In the second section of the report the characters of the injuries are discussed in connection with their causes. Especially noteworthy is one case, in which hæmorrhage into the vitreous was caused by the atmospheric pressure of a shot discharged close to the left temple ; detachment of the retina followed. In 11 cases the injury was attributed to the passage of a missile close to the eye without touching it, but in these the possibility of an actual blow from other substances accompanying the missile cannot be entirely excluded. In a case published elsewhere, by Saemisch, a Chassepôt bullet entered the orbit at the outer commissure without wounding the lids or the globe ; the eye could read small print after the injury. Twelve days later pus was evacuated by an incision, and the bullet was extracted. Later the eye became blind.

The bullet injuries were inflicted sometimes directly from in front, sometimes from one or other side. Among 69 cases of the latter kind the temporal wall of the orbit was perforated in 34, the nasal wall in 15, the roof in 15, the floor in 5. Two eyes were destroyed by shots from behind. In 28 cases both eyes were injured by bullets, and in 9 of these both were immediately destroyed. In many cases bullets were split or shattered by striking upon the margin of the orbit, or upon the bridge of the nose.

The injuries caused by shells were of many kinds. In some cases a large fragment carried away, together with the eye, large portions of the face and skull ; in others the eye was damaged by minute splinters. Many injuries were caused, not by the missile itself, but by other bodies driven by it against the eye, *e.g.*, stones, sand, fragments of spectacle glass, the bent peak of a helmet, and, in one case, a piece of horse-flesh. Cut and thrust wounds were rare, as also were

those produced by the men's own weapons, or those of their comrades.

In the third section typical injuries are described. The supposition of permanent damage from mere shake or concussion is entirely rejected. Such damage depends upon choroidal hæmorrhage, fracture through the optic foramen, and other less evident structural changes. No case of loss of sight due to copious loss of blood was recorded throughout the campaign.

The fourth section deals with the cases according to the manner of the injury and the particular tissues injured. Destruction of the entire eye is discussed first, then the injuries of the tunics. Partial detachment of the iris occurred both at the immediate point of the injury and at the opposite side of the circle. Retroflexion (Umstülpung) of the iris was observed in two cases.

Among 9 cases of blepharospasm 5 were due to injury of the supraorbital, 4 to injury of the infraorbital nerve.

So far as is known 72 operations had been performed in consequence of the injuries under consideration, among which were 31 enucleations, 5 cataract operations, 7 iridectomies, and a few plastic operations on the lids.

The fifth section deals with sympathetic affections in the fellow eye. Ninety-nine such cases are recorded, but in many of these the diagnosis would appear to be somewhat uncertain. In fifty-one per cent. of the cases of supposed sympathetic affection there were subjective symptoms only ; in seventeen per cent. affections of the conjunctiva ; in eighteen per cent. inflammation of the anterior segment of the eye ; in thirteen per cent. inflammation of the fundus. Enucleation was performed twenty-three times for the prevention or relief of sympathetic disease. In six of these cases, five of which were operated on within ten days of the accident, the uninjured eye was healthy ; in five it improved after the enucleation ; in twelve the operation had no beneficial effect. Of the injuries which destroyed the existing eye, or left a foreign body in it, or set up a cyclitis, fifty-six per cent. are said to have caused sympathetic inflammation. Panophthalmitis appears to have had this result as frequently as other forms of traumatic inflammation, whilst the less intense inflamma-

tions which gradually destroyed the eye caused sympathetic inflammation in thirty-three per cent. of the cases. The injuries which immediately and completely destroyed the eye caused it in sixty-three per cent. The sympathetic disease appeared most frequently during the second six months after the injury.

Perhaps the most important point in these statistics is the fact that sympathetic ophthalmitis occurred in a considerable number of cases. It would be interesting to know whether this arose through unwillingness on the part of the men to submit to enucleation, or to the want in the military hospitals of surgeons specially experienced in ophthalmic practice. In either case this most carefully elaborated report will have the effect of emphasising the danger of an excessive conservatism in this department of surgery. P. S.

O. BESELIN (Berlin). Zonular Cataract with Microscopical Examination. *Archiv. of Ophthalm.* (*Knapp*), Vol. XVII., 3, p. 318. Translated from German edition by Weeks.

LAWFORD (London). Pathological Anatomy of Zonular Cataract. *Roy. London Ophth. Hosp. Reports*, Vol. XII., pt. 2, p. 184.

The cataract examined by Beselin was removed from the eye of a man upon whom Græfe had operated in 1862, by iridectomy, the patient being then 50 years old. In 1886 Schweigger removed the cataract, dividing the lens capsule peripherally.

The cortex of the freshly extracted lens was very slightly hazy, and between it and the nucleus the opaque zone could be seen as a thin uniform layer of a somewhat yellowish colour. In this opaque zone the sectors seen in the crystalline lens were very well marked. Inside this zone the nucleus lay apparently transparent. After hardening and embedding in celloidin, sections were cut by a microtome, and stained with various reagents. These sections showed the cataractous zone as an oval band of from 0.016 to 0.08

mm. in thickness, more convex on its posterior than on its anterior aspect. Under the microscope this band lost its continuous appearance and seemed interrupted at the equator, the anterior part overlapping the posterior, as though the latter occupied a layer of lens substance nearer to the centre than the former. Outside the posterior the anterior seemed as if it were continued in single short lines, which, if united, would form a continuous band with the outer zone. In the same manner the inner posterior zone was represented by a single line on the posterior side of the anterior band. The zonular cataract was, therefore, double, composed of two incomplete zones, which in places ran together, and in places were separated by unchanged lens substance. Short transverse bands united the two zones, especially in front, and, outside them all, small single lines indicated faintly a third zone. At the equator and at the poles short opaque striæ (like those in senile cataracts) were seen, but the nucleus was free from such opacities.

Under high powers both inner and outer zones appeared to consist of one or more fissures filled with granular masses, which, by possessing an index of refraction lower than that of the normal lens substance, produced the opacity. These masses seemed formed of large granules (under very high powers) of uniform size, and among them were scattered round highly refractive bodies of a single contour, which remained unchanged when treated with Lugol's solution or sulphuric acid, and were considered to be fat globules. No cholesterin crystals or calcareous matter were seen. Single lens fibres in places crossed or dipped in and out of these fissures. The walls of the fissure, except on the side next the nucleus, seemed formed of normal lens substance, but evidence of granular degeneration was present in places. Numerous short fissures of a different character were present in the cortical layers.

The nucleus contained numerous distinct coagulated masses, apparently post-mortem changes due to the action of alcohol. Under high powers they appeared long, spindle-shaped, or round, and finely granular. They were not stained by alum, carmine, or hæmatoxylin, but stained like the surrounding tissue when treated with Lugol's solution.

These masses appeared to lie between the lens fibres, and only occupied the nucleus interior to the inner cataractous zone. Beselin considers these post-mortem changes due to some difference in the chemical constitution of the nucleus and that of the cortex, which difference itself existed before death.

Zonular cataract is produced, according to Arlt, by the friction of a hard nucleus against a soft cortex during infantile convulsions, and, according to Horner, by the deposition of a pathological layer of lens substance round a nucleus previously normal. Leber somewhat modifies this latter view by holding that the normally-formed layer might change subsequently. Neither of these theories is satisfactory in the case under examination, for there was no layer of opaque lens substance present, but merely a fissure or fissures between lamellæ of lens fibres. The observations correspond closely to those of Forster, who, in senile cataracts, found fissures filled with a granular substance lying between concentric lens fibre layers, as also described by Becher. Both these authors attribute the fissures to uneven contraction of the fibres in different layers of the lens substance, which, therefore, forms the first step in the formation of cataract; and Becher considers Priestley Smith's observations on the decrease of volume in cataractous lenses as confirming this view.

The small size of lenses, with zonular cataract, favours this theory of shrinking; and, indeed, Græfe long ago attributed the decrease to shrinking of the nucleus. The abnormally high index of refraction found by Tehenden, Matthiessen, and Jacobson in the nuclei of zonular cataracts also favours the theory of shrinking. Beselin then concludes that some chemical alteration in the nucleus is the first step in the process of shrinking which produces the circular fissure, and a continuation of the process forms the second opaque zone, the separation and degeneration of neighbouring lens fibres being merely a secondary effect, induced by the formation of fissures in the lamellæ of the lens. The nucleus here spoken of represented the whole lens at the period of development when the supposed chemical change

took place, and the fibres subsequently formed were not similarly affected ; hence the uneven shrinking, the fissures filled with granular deposit, and the degeneration of adjoining lens fibres.

A careful description is given in this paper, by Lawford, of the microscopical appearance in three zonular cataracts which had been extracted, one in its capsule and the other two after division of the anterior capsule with a cystitome. The appearances seen in all these were very similar. In all there was a nuclear or central area of moderate size, the outlines of which ran a nearly parallel course to those of the whole lens. The layers external to this, the cortical layers, exhibited no changes of any import, merely a few small patches of degeneration. The line of demarcation between the cortical and nuclear areas was abrupt, and showed in places indication of a thin layer, somewhat like a twisted rope in appearance, which probably extended all round and enclosed the central area, but exhibited numerous breaks in the sections examined. Lawford is inclined to attribute to this layer considerable importance, as being probably the essential part of the lamellar cataract. Its edges were finely dentated, as if it were formed of lens fibres, and, if so, more than one fibre must have been implicated, as its thickness exceeded that of the normal lens fibre.

In the nuclear area of all three specimens there were large numbers of small irregular dots or particles, arranged more or less in layers, which seemed to run concentrically, as if following the laminae. Lawford believes that these particles are in all probability coagulation masses, the result of the fluids employed in hardening the lenses, but he calls attention to the remarkable fact of their being entirely restricted to the central area, and suggests that there must be some diffuse change in the nuclear part of lenses with lamellar cataract, so that it is affected by hardening fluids in a different way to the cortical portion.

J. B. S.

GESSNER (Bochum). Enophthalmus Traumaticus.
Arch. f. Augenheilk. Bd. xviii., Heft. 3.

Medical literature contains manifold descriptions and reports of cases of Exophthalmus in its varying relations, but of the opposite condition, Enophthalmus, there are but few records. Von Graefe described this condition as it occurs in cases of cholera* ; since his observation some half-dozen cases have been reported.

Gessner, in his paper, furnishes details of three cases observed in Nieden's Clinique, all of traumatic origin, and affecting one eye only.

Case 1.—A miner, nine months before he came under observation, was knocked down and stunned by a mass of coal in the mine, sustaining a fracture of the right inferior maxilla and zygoma, and an incised wound of the upper margin of the orbit on the same side. Ten days later, when the swelling of the eyelids had subsided, he found that his "right eye was smaller than the left."

Immediately above the right orbit is a non-adherent scar, extending from the supraorbital notch to the outer canthus. There is a trough-shaped depression in the lids around the eyeball, which is itself sunken about three mm. The palpebral fissure is two mm. shorter than its fellow. The finger can be passed more deeply between the globe and the orbital wall in this than in the healthy orbit.

The levator palpebræ is defective, a condition of partial ptosis obtains. Upward movement of the eyeball is somewhat restricted ; downward movement more free than usual ; its lateral excursions are of full extent but slowly effected. Ophthalmoscopic examination reveals no defect. Acuteness of vision normal. Binocular vision retained. Pressure in the neighbourhood of the trochlea causes pain.

Case 2.—A miner who, eighteen months previously, was struck on the forehead by a lump of coal, and rendered unconscious. The right orbital region was lacerated, and a

* Arch. f. Ophth. xii., 2, p. 200.

fortnight later patient found that " his right eye was smaller than his left."

On admission, the non-adherent scar of a wound stretches from the right supraorbital notch outwards to the canthus. The upper lid on this side is sunken into the orbit and the palpebral fissure narrowed. Movements of lids normal. Eyeball sunken about 3 mm. deeper than the left. Its upward movement is restricted, its downward movement unusually free. Vision in this eye = $\frac{1}{8}$, and there are some fine choroidal changes on the temporal side of and near the optic disc. Media clear, refraction low hypermetropia. The patient states that the sight of his right eye was good before the accident, but it seems probable that there had been defect of this eye, only discovered by him after the injury. Pressure in the orbital region gave rise to some pain.

Case 3 also occurred in a miner, who in 1882 was buried by a fall of coal, and sustained lacerated wounds about the orbits and forehead, in consequence of which he was laid up for three weeks. When recovering he discovered, as the two previous patients had done, that his right eye looked smaller than his left.

On admission, an adherent scar, the result of his wound, stretches from the right supraorbital notch inwards to the internal angular process of the frontal bone. The right upper lid is drawn back deeply into the orbit, but is not at all adherent; the lower lid is also retracted, though less markedly. The retraction is shown in a woodcut as a deep hollow between the peripheral attachment and the ciliary border of the lids. The palpebral fissure is 2 mm. narrower than the left. Partial ptosis of the right lid is present, and cannot be overcome by any effort. The right eyeball is sunken, its surface about 3 to 4 mm. deeper than that of its fellow. Its upward and outward movements are restricted considerably, its inward and downward movements to a much less extent. The orbital cavity is accessible, for digital exploration, to an exceptional degree. V. of right eye is normal, and there are no ophthalmoscopic changes. Homonymous diplopia on looking to the right.

The appearance of the sunken globe in all three cases resembled very closely that so often noticed when an artificial eye is worn.

In discussing the cause of enophthalmus, the author first combats the possible objection that these might have been cases of one-sided microphthalmus, by pointing out that the cornæ and the keratoscopic images were of equal size, and the refraction of the two eyes similar, with, in two of the cases, equal acuity of sight. He considers the most likely explanation of the condition is that a cicatricial contraction of the retro-bulbar fat and cellular tissue occurs, as a result of inflammatory reaction following a wound in the neighbourhood. The inflammation would not improbably involve the periosteum and cellular tissue of the orbit, and lead to shrinking of the latter. He thus looks upon the enophthalmus as a mechanical displacement of the globe, due to diminution in volume of the cushion of fat upon which it rests.

The defective movements of the eyeball and lids, Gessner thinks, is best explained by the approximation of the two ends of the ocular muscles, consequent on the sinking of the eyeball; he rejects the theory that implication of these muscles in the orbital inflammation leads to adhesions between them and surrounding structures, whereby their movements are limited. It appears to us, however, that his evidence on this point is insufficient.

J. B. L.

TH. LEBER (GOTTINGEN). On the occurrence of Inflammation and the causes which excite it. *Fortschr. d. Med.*, 1888, No. XII. Abstracted in *Centrabl. f. prakt. Augenheilk.*, Oct. 1888, p. 311.

The author upholds the opinion of those experimenters who maintain that inflammation and suppuration may be excited by purely chemical action without the co-operation of microbes. He describes a series of new experiments which strengthen this position.

In certain forms of mycotic keratitis the focus of infection

and the necrosis which it produces are separated by a definite space from the surrounding inflammatory and suppurative changes, and this separation suggests that the micro-organisms exert a distant irritation by means of some soluble product which diffuses itself in the neighbouring tissues. In pursuit of this idea Leber has succeeded in showing that micro-organisms, killed by heat, are capable, when introduced into the anterior chamber of the eye, of exciting an intense suppurative inflammation, which has, however, unlike the living cocci, no tendency to extend beyond that region. On attempting to isolate the substance which is the essential cause of the inflammation he obtained a crystalline product which possesses definite and characteristic reactions, and to which he gives the name *phlogosin*.

He observes further that when the irritating substance is introduced into the anterior chamber, it is, in a short time, surrounded by immigrating corpuscles, which approach it from all sides, even in opposition to the force of gravitation. This attraction takes effect not only upon free leucocytes outside the vessels, but also upon those which are within the vessels, and hence there is later, at that part of the corneal margin which is nearest to the focus of irritation, a circumscribed formation of new vessels tending towards it.

This cell attraction must be regarded as a reaction on the part of the organism for its own protection against the invading irritant, or rather for the elimination of the latter. The leucocytes effect this desirable end by phagocytosis and hystolysis, a line of demarcation being formed and the necrosed tissue thrown off. That this process can be effected without the presence of microbes was proved by the employment of hypopyon-pus which was free from micro-organisms.

Inflammation may, therefore, be regarded as a purposive act on the part of the organism in opposition to injurious influences from without. It includes various processes, certain of which, viz., the emigration of the white blood-corpuscles, their attraction towards the centre of irritation, and their hystolytic action, depend upon the vital properties of the cells.

P. S.

CHAUVEL (VAL-DE-GRÂCE). Myopia, and its relation to Astigmatism ; a statistical and clinical study.

Archiv. d'Ophtalmol., Vol. VIII., Nos. 3 and 4.

In this paper Chauvel gives in detail the facts and figures obtained by the examination of 1,248 myopic eyes in 693 patients. In nearly all the cases both subjective and objective tests were employed ; the amount of astigmatism was determined by the ophthalmometer of Javal and Schiotz. The eyes were not atropinised. Seven groups of cases were formed, the division depending on the degree of ametropia : (1) myopia 0.25 D. to 1D., 108 eyes ; (2) myopia 1D. to 2D., 276 eyes ; (3) myopia 2D. to 3D., 234 eyes ; (4) myopia 3D. to 4D., 135 eyes ; (5) myopia 4D. to 6D., 240 eyes ; (6) myopia 6D. to 9D., 196 eyes ; (7) myopia above 9D., 59 eyes.

For much that is of interest in this paper we must refer our readers to the original. From a study of his cases the author arrives at certain conclusions, which seem to be logical deductions from the figures given in his tables. These conclusions are :—

(a) The amplitude of accommodation is not notably or regularly modified in myopia ; it is nevertheless generally diminished to a slight extent in the higher degrees of this error of refraction.

(b) The visual acuity, for distant objects, *without correcting glasses*, diminishes rapidly, in proportion to the increase in the degree of myopia ; *with correction by spherical lenses*, visible acuity shows a progressive and notable decrease in high degrees of myopia.

(c) The field of vision in high myopia exhibits a progressive, and fairly regular, contraction in all directions.

(d) The development of posterior staphyloma follows regularly the development of myopia ; the former increases in extent in proportion as the latter increases in degree. This relation is so constant that it affords good evidence of the intimate relation which obtains between the ametropia and the lesions of the choroid, so often present.

(e) Regular astigmatism, which is by no means uncommon in low degrees of myopia, occurs with much greater frequency in cases of high degree ; but there is no constant relation between the two forms of ametropia. They are

often present coincidently, but are in no sense dependent one upon the other.

(f) Although in some cases in which astigmatism exists the situation of the myopic crescent seems to bear relation to the principal meridians of refraction, it is clearly shown by the data obtained that the inclination of these meridians has no influence in determining the position of the staphyloma. J. B. L.

SILEX (Berlin). The Question of Accommodation in Aphakic Eyes. *Arch. f. Augenheilk., Bd. xix., Heft. 1.*

In consequence of an apparent power of accommodation in the aphakic eyes of several patients at the University Clinique, the author undertook an investigation to determine, if possible, how this power could be explained.

The patient with whom he experimented was a lad æt. 14, who, in 1882, had undergone discission operations for lamellar cataract. In 1887 V. was as follows :

$$R. + \frac{1}{3\frac{1}{2}} v. = \frac{6}{18}, \text{ pupil active.}$$

$$L. + \frac{1}{3\frac{1}{2}} v. = \frac{1}{30}, \text{ secondary cataract.}$$

The right eye, with the same glass, read 0.4 (? Jæger's types) at 20 cm., without changing the position of the lens. No other glass gave him as good vision : but with concave lenses up to $\frac{1}{2\frac{1}{4}}$ held immediately in front of his own lens he still saw $\frac{6}{18}$.

His right eye was then atropinised, and a stenopaic plate with a 6 mm. aperture placed before it. With the same glass $(+ \frac{1}{3\frac{1}{2}}) v. = \frac{6}{18}$, and 0.6 at 20 cm. To make sure that there was no alteration in the position of the lens the following procedure was adopted :—The patient looked through a fixed tube 10 cm. long and 1 cm. in diameter, to the end of which was attached immovably a $+ \frac{1}{3\frac{1}{2}}$ lens. With the pupil dilated by cocain, and an eye-speculum introduced, $v. = \frac{6}{18}$, and 0.6 at 20—30 cm.

This case is the most noteworthy of those which came under the author's notice, and he does not give details of the others.

After referring to Donders' paper * the author discusses the various theories which have been advanced in explanation of this apparent power of accommodation, such as increased curvature of cornea from compression by the external ocular muscles, or antero-posterior elongation of the globe from the same cause. This latter change Schneller thinks takes place with every effort of accommodation, for he found that, if in healthy eyes he paralysed the ciliary muscle by atropine, there still remained a certain power of adaptation for near objects when the eyes were converged and rotated downwards. This power he calls "external accommodation," and this an aphakic eye might possess.

By examining his patient with the ophthalmometer, Silex convinced himself that no such elongation of the eyeball occurred with downward rotation and convergence. With these movements, however, the active pupil of his right eye contracted, and by this means he obtained more distinct retinal images.

Silex concludes that the aphakic eye is quite devoid of the power of accommodation, as ordinarily understood, and explains his own case by assuming that the lad possessed, in an unusual degree, the power of getting correct impressions from indistinct retinal images. He also thinks it possible that the patient varied the distance between his eye and the lens by slight movement of the latter, and thus practically increased its convexity.

J. B. L.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, DECEMBER 13TH, 1888.

J. W. HULKE, F.R.S., President, in the Chair.

Reported by JOHN ABERCROMBIE, M.D.

Case of Pulsating Exophthalmos.—Dr. A. BRONNER read the notes of this case. The patient was a farmer, aged 66, who, at the age of one year old, had sustained an injury to his head through a fall, followed immediately by protrusion

* *Über scheinbare Accommod. bei Aphakie.* Arch. f. Oph. xix., p. 56.

of the right eye. Pulsation and protrusion of it had been noticed ever since to such an extent that he could not quite close the lids, but it had never caused him any trouble; his general health had always been good, and he had led an active life. The right orbit was larger than the left, and the right globe was dislocated downwards, forwards, and outwards, but could easily be replaced; it pulsed synchronously with the pulse. The movements of the globe were very limited in all directions, but there was no strabismus, and the sight was good; the cornea, iris, media, and fundus were practically normal, except for a few striæ in the lens. On auscultation of the eyeball a roaring continuous *bruit* could be heard, increased during the systole, and almost stopped by pressure on the carotid in the neck. A short time after these observations were made he had an obscure illness, in consequence of which the eye receded a good deal, and the *bruit* became much less marked. The case was clearly one of arterio-venous communication between the internal carotid artery and the cavernous sinus, of traumatic origin. The distinctly continuous *bruit*, the fact that the eye could fall back into the socket so readily, and the absence of past or recent papillitis were proof against any other diagnosis. The case was of great importance, as showing that such a condition might become and remain stationary during so long a period as sixty-five years. Mr. HULKE agreed in the diagnosis of aneurysmal varix; it could be neither a neoplasm, an arterial aneurysm, nor a varicose aneurysm; for in the latter case it would certainly have become larger. It was interesting to see that it had gone on so many years without giving trouble, and it agreed in this with the similar lesions seen in the limbs. The patient was not conscious of a sound, and yet on stethoscopy a loud roaring was heard. He referred to one of the first cases of the kind he had seen, in which the common carotid was tied. In that instance the roaring was so loud that the patient's husband could not sleep with his head on the same pillow. In Dr. Bronner's case the patient had probably become habituated to the sound, owing to its extremely long dura-

tion. Mr. LAWFORD asked what the nature of the illness was during which the proptosis receded, and what was supposed to have been the cause of that recession. Mr. DOYNE thought that the absence of any sign of papillitis was not of much value, as he had certainly witnessed complete recovery from that condition so that no trace of its existence could be detected. Dr. JAMES ANDERSON mentioned the case of a girl who had recurrent optic neuritis. She had had three attacks, and perfect vision after them. Between the first and second attacks a very loud murmur was heard on auscultation over the eyeball, and it was audible to the patient; before disappearing the murmur changed its character, and became rough. There was no aneurysm in this case, but there was some spinal cord disease, as the patient subsequently developed paraplegia and paralysis of one shoulder. Dr. BRONNER, in reply, stated that the illness from which the patient had previously suffered was of hepatic, and not cranial, nature. If papillitis had been present it ought not to have subsided, for it could only have been due to arterial obstruction.

Suppurating Hydatid Cyst of Orbit.—Dr. ROCKLIFFE communicated this case. The patient, a labourer, aged 33, had first noticed an affection of the sight of the left eye in 1882. He had several attacks of inflammation in it, and the vision gradually deteriorated, till in April, 1887, it was quite blind. There was then marked protrusion, some ptosis, and the action of all the ocular muscles, except the external rectus, was very limited; nothing definite was made out as to the condition of the orbit. Eighteen months later, having had more attacks of pain, the patient consented to an operation. An exploratory puncture with a scalpel having given no result, the orbit was more freely opened up, and, the eye being removed, a suppurating hydatid cyst was found at the apex of the orbit. The rarity of the affection and the difficulties of diagnosis were briefly alluded to. Mr. BRAILEY asked if there were hydatids in other parts of the body. In one case he had seen it would have been impossible to have made the diagnosis if the bosses caused by the development

of hepatic hydatids could not have been felt. He thought that in Dr. Rockliffe's case the hydatid had developed in the substance of one of the ocular muscles. Mr. HULKE had only seen three or four cases, and he thought an absolutely certain diagnosis could not be made. In one of these cases there had been suppuration. He did not see how suppuration could be caused by rupture of a daughter cyst. Dr. ROCKLIFFE, in reply, said the patient attributed the suppuration to a blow with a piece of iron. No hydatids could be found elsewhere. He thought it had developed behind the eye, and not attached to the muscles, for the patient had free movement in every direction.

A Peculiar Form of Degeneration of Lens.—Mr. DOYNE gave a brief account of a case where there was a difference in refraction of eleven dioptries between the periphery and the centre of the lens. This produced an appearance of nuclear opacity, which, however, was only apparent, due to the reflection of some of the light rays as they entered a denser medium. The lens was everywhere perfectly transparent. The patient was 70 years of age, and the condition had been developing for some years. Mr. HARTRIDGE asked if the condition could not have been congenital. He referred to a case in a girl, aged 17, in whom there was an obvious difference of refraction between the centre and periphery of the lens, the former looking like a globule of oil. Dr. BRONNER thought that many cases were ascribed to conical cornea and astigmatism which were really due to irregularities in the lens. The keratoscope, an instrument not used sufficiently, would show the cornea to be normal, proving that the error of refraction was in the lens. Mr. DOYNE replied that he did not think the case was congenital, for the patient certainly saw very much better when she was young, and he had positive evidence that the defect had much increased of late.

A Case of Recurrent Transient Blindness.—Mr. DOYNE read the notes of this case. The patient had been invalidated home from India after malaria fever: before his return he had a sudden attack of blindness, which completely cleared in five minutes. Another attack came on suddenly soon

after his arrival in England, while drying himself after his morning bath, and had not quite passed off three weeks later. When he first came under notice, two days after the attack, the upper half of the field of vision was restored. There was a dense white fog in the upper half of the fundus, completely veiling the choroid, but in which the retinal vessels stood out brilliantly. There was no plugging of any of the retinal vessels, and the cause of the attack seemed doubtful. Dr. ANDERSON had recorded a case of almost symmetrical loss of the lower half of both fields of vision. The patient was the subject of ague, and the trouble came on after a long ride. The patient also had hemianæsthesia, and undoubtedly had a lesion, probably vascular, affecting the visual area in the brain. Dr. BERRY said these cases were often diagnosed as embolism, whereas they were cases of spasmodic constriction of the arteries of the retina, producing either blindness or scotomata. When partial a scotoma was produced, and this, though it usually disappeared, might remain permanent, without being accompanied by any ophthalmoscopic changes. In one case he had seen the condition of constriction shortly after it had developed, and there was an œdema of retina corresponding precisely to the scotoma. He believed there was a very intimate connection between some of these cases and glaucoma. Certainly embolism could not disappear so quickly. Mr. HULKE said it seemed difficult to believe that arterial spasm could last for several months. Mr. LAWFORD asked if the patient had taken large doses of quinine, as that might cause spasm. Mr. DOYNE thought that Dr. Berry's explanation was more plausible than that of embolism, but his case was exactly analogous to one reported by Dr. Mules last session. The patient had taken quinine, but he did not know in what doses; as a rule quinine produced a long-continued narrowing of the vessel.

Card Specimens.—The following patients and card specimens were shown: Dr. ROCKLIFFE: 1. Case of Proptosis. 2. Two Cases of Tumour of the Eyeball, with Microscopical Sections.—Mr. G. HARTRIDGE: A case of Choroiditis.—Messrs. CRITCHETT and JULER: Case of Double Pseudoglioma.—Mr. JULER: Reuss's Diaphanoscope.

Presentation to the Library.—At the commencement of the meeting the PRESIDENT announced that a work descriptive of the various German ophthalmic hospitals had been most kindly presented to the library of the Society by Professor von Zehender, an honorary member and former Bowman Lecturer.

RECENT LITERATURE.

A. RETINA. OPTIC NERVE. CENTRES.

DOR. Un cas de colobome maculaire des deux yeux chez un enfant microcéphale.

Rev. Gén. d'Ophtal., VII. 7.

EWETZKI. Une anomalie congénitale rare du fond de l'œil.

Westnik. Ophthalmolog., July—Oct., 1888.

FICK. Studien über Licht und Farbenempfindung.

Arch. f. Physiol., XLIII.

GORECKI. Pièce anatomique d'un décollement de la rétine.

(*Soc. d'Ophtal. de Paris*) *Progrès Méd.*, July, 1888.

GUENE. Deux cas rares d'altérations du fond de l'œil.

Westnik. Ophthalmolog., July—Oct., 1888.

HAUER. Über Hemianopie als Theilerscheinung des Symptomen complexes frischer cerebraler Hemiplegien.

Prag. Med. Woch., Nos. 44, 45, 1888.

LANNEGRACE. Note relative à l'hémiopie homonyme et à l'amblyopie croissée.

(*Acad. de Med.*) *Union Médicale*, Nov., 1888.

MELLINGER. Ungewöhnliche grosse retinale Hæmorrhagie in der Gegend der Macula. Vollständige Resorption mit Wiederherstellung des vollen Sehvermögens.

Klin. Monatsbl., Oct., 1888.

PICQUE. Étude critique sur l'anatomie pathologique et la pathogénie des névrites optiques.

Arch. d'Ophtal., VIII, Nos. 5 & 6, 1888.

WEEKS. A contribution to the Pathology of Albuminuric Retinitis.

Arch. of Ophthal., Vol. XVII., No. 3, p. 276.

B. UVEAL TRACT. VITREOUS AND AQUEOUS. LENS

BERGER. De la chambre postérieure de l'œil.

Semaine Médicale, No. 10, 1888.

DESPAGNET. Persistance du canal de Cloquet.

(Soc. d'Ophtal. de Paris) Progrès Méd., July, 1888.

DESPAGNET. Cas présumé de cysticerque du Corps Vitré.

Rec. d'Ophtal., Sept., 1888.

EWING. Über ein Bauverhältniss des Irisumfanges beim Menschen.

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SOME OCULAR AND NERVOUS AFFECTIONS IN DIABETES AND ALLIED CONDITIONS.

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Ophthalmic surgeons are accustomed to meet with cases of neuritis and of retinitis for which there is no obvious cause, where, to all appearance, intracranial growth, renal disease, diabetes, and other recognised causes of inflammation of the optic nerve and retina can be excluded. The physician rarely sees these cases in the first place, but several have been sent me for examination by ophthalmic friends and colleagues. My chief purpose in the first part of this communication is to narrate clinical histories which indicate, I believe, the explanation of some of these cases. These histories I shall venture to relate in greater detail than is ophthalmologically necessary, and I shall refer subsequently to certain points of general clinical interest brought out in the histories, without, of course, attempting anything like a systematic exposition of them. For any evident gaps in the histories, those accustomed to out-patient work in a large hospital will readily find excuse.

Case 1.—James B., aged 49 years, a Customs officer, came to the out-patient department of the London Hospital in March, 1886, and has attended regularly since then, for the first few months under the care of Dr. Stephen Mackenzie and latterly under mine.

In January, 1886, he noticed his sight beginning to fail,

but went on with his work, that of "tallying" at the Docks, until March, 1886, when he went to Moorfields Eye Hospital to get spectacles. He was there told that he had diabetes, and was sent to the London Hospital. He had noticed nothing wrong with his general health, had no feeling of languor or weakness, no frequency of micturition (except one day in February, 1886, during which he micturated eight or nine times), and no special thirst. I may say here, parenthetically, that he has never during the three years that have elapsed since the commencement of his illness had any of these symptoms.

When first seen by Dr. Mackenzie his urine had a specific gravity of 1019, and contained abundant sugar, no albumen. The diagnosis of diabetic retinitis was made, and he was ordered a grain of carbolic acid and a drachm of lactic acid thrice daily. He doubtless also received directions as diet. During the next four months the urine, examined about fortnightly, varied greatly both as to the specific gravity and the presence of sugar:—(1) 1022 much sugar, (2) 1010 no sugar, (3) 1012 sugar present, (4) 1010 no sugar, (5) 1022 trace of sugar, (6) 1020 sugar present, and (7) on July 28th, 1886, 1030 sugar present. It never contained albumen.

During these four months I had on two or three occasions an opportunity of examining his eyes. I found numerous hæmorrhages and many white patches scattered irregularly over the fundi, both the hæmorrhages and the white patches varying in size, but none of them large. There was no hæmorrhage into either vitreous and no opacity of either lens. The hæmorrhages and white patches were not unlike those of albuminuric retinitis, with a difference. The hæmorrhages were not flame-shaped, but mostly more or less circular, with crenated edges, and dark brown colour, lying, for the most part, under the retinal vessels, and suggesting that they were situated in the deep layers of the retina rather than the nerve-fibre layer. The white patches differed from those of albuminuric retinitis in being a less clear white, in being irregularly scattered over the fundus, not having the asterisk arrangement of the small shiny white spots at the macula in albuminuric retinitis, and in

not being so large or soft-edged as the larger white areas present round the disc in albuminuric disease.

On August 11th, 1886, he came under my care, and I found that, although a fortnight previously he had passed a urine of specific gravity 1030, with well marked sugar reaction, he now at 11 a.m., after a breakfast of toast and cold sugarless tea with milk, had passed a urine of specific gravity 1008, containing no albumen and no sugar. There were no fresh hæmorrhages and the old were either a darker brown or had begun to get pale, according as they were larger or smaller. His sight was at this time very defective. I have unfortunately no note of the exact amount of defect, but he could not read large type with his spectacles. During the next three months the urine was examined fortnightly. It varied in specific gravity from 1025 to 1032, always contained sugar, never albumen, and in daily amount probably varied from three to four pints, but was accurately estimated only on two occasions.

On November 10th, 1886, his urine had a specific gravity of 1020 and contained no sugar, and from that date till now the urine, examined fortnightly either by myself or the clinical assistant, has contained sugar only on two occasions, in October, 1887, and June, 1888, when a trace was found by the clinical assistant. It has varied in specific gravity from 1005 to 1030, but usually from 1010 to 1022. In September, 1887, he had a sharp attack of perityphlitis with considerable swelling and pain, but it subsided, and has given him no farther trouble. His vision greatly improved, and his general health, apart from the above attack, was excellent.

The patient is a thick-set, stooping and formerly florid man, now 52 years of age, with recently increasing yellow pallor of complexion, still fairly stout, although 12 years ago he weighed 14 stone and now he weighs only 11½. He has strong "gouty" teeth, sound, yellow, well worn down and brown in the centre, has Dupuytren's contraction of the palmar fascia, especially in the R., has no deformity of the toe or finger joints, and states that he has never had gout or apparently any symptom of it. He has been an exceptionally healthy man, and there is no evidence pointing to syphilis.

His father died at 73 of heart-disease, his mother at 64. Neither had gout or diabetes so far as he knows. He can give no explanation of the commencement of his trouble, and with the exception of his sight, as I have said above, it has given him no trouble, unless a phimosis, which he had operated on 6 years ago can be attributed to it. He has always been an abstemious man, and since 1886 he has taken no stimulant, no sugar, sweets or potato, takes meat and greens twice daily, toast and occasionally a piece of bread with tea and coffee. His digestion is good, his heart and lungs sound. His arterial tension is slightly raised, but there is no arterial thickening. His nervous system, both motor and sensory, seems normal, but the knee-jerks are elicited only with the help of Jendrassik's method.

His eyeballs are prominent, his conjunctivæ somewhat œdematous and brownish; ocular and pupillary movements normal. V.R.=J₄, L.=J₁ with his spectacles, and he reads newspaper type easily. The fundi have not altered during the past two years. The discs and vessels are normal. Numerous rounded reddish-brown spots are scattered over both fundi, and also small angular greyish white spots, those in the R. eye invading the macula, but quite irregular in distribution there as elsewhere.

He believes he passes three to four pints of urine daily, and I examined two specimens on January 10th. The first, passed before breakfast, pale straw colour, no deposit, 1012 acid, no albumen, and no sugar; the second, passed at noon after a breakfast of bread, sugarless coffee and milk, amber, no deposit, 1025, acid, no albumen, and a definite sugar reaction, but only when the urine was added in equal amount to Fehling's solution.

Case 2.—Henry T., aged 70 years, a carpenter, had noticed failure of vision, especially in his R. eye, for 12 months, and went to Moorfields Eye Hospital on July 30th, 1888, for this reason, the sight of the R. eye having failed rather rapidly just before this, so that with his spectacles + 7.5D. he got only V.R.=J₁₆ barely, L.=J₁₀. Mr. Stanford Morton found an opacity in the R. lens and hæmorrhagic retinitis, with sugar in the urine, and sent him to me.

The patient was a strongly built, hale-looking old man, who had lived well but carefully. He considered that he had been an exceptionally healthy man till 18 months before, but he had had a severe attack of gout 20 years before, and repeated attacks since till seven years ago, when they ceased to recur. Eighteen months before he had had an attack of left-sided pleurisy, but, apart from being rather more easily tired than formerly, and being troubled with constipation, he felt perfectly well when his sight began to fail. He had no abnormal thirst or increased frequency of micturition. The family history of gout was very strong, his father, who died at 72, having suffered from it, and two brothers having died from it. One of the patient's sons is asthmatic, but his other children are healthy.

The patient had no evident disease of his joints, either hands or feet, but had well-marked contraction of the palmar fascia. His heart and lungs were sound, his arterial tension not increased. He was somewhat troubled with cold hands and feet, and he had slight œdema of the legs. His urine had a specific gravity of 1025, and contained abundant sugar, no albumen. He believed the amount not to be excessive.

The nervous system appeared to be normal, except that I could not elicit the knee-jerk on the R. side, and it could only just be elicited on the L. I subsequently elicited it also on the R. He had no pain or complaint except as to his eyes. His pupils were equal and reacted somewhat sluggishly both to light and with accommodation. I could get no distinct view of the fundi owing to lens opacity. On subsequently dilating the pupils I found a reticular opacity in the centre of each lens, denser in the R. In the R. fundus, a little to the nasal side of the macula, were two opaque white spots forming a thick-legged V, opening obliquely downward and inward, and about a third of the disc diameter in length. Between this and the disc was a reddish brown elongated hæmorrhage stretching up and out. The rest of the R. fundus and also the L. fundus was apparently healthy.

He was put on diabetic diet with gluten bread and codeia gr. $\frac{1}{2}$ thrice daily, and he has continued this treatment,

avoiding sugar entirely, potatoes almost entirely, taking brown bread occasionally. On August 13th, his urine was only 1013 in specific gravity, but yet gave a copious sugar reaction, that is, only three or four drops of urine were required to give a marked sugar reaction with two to three drachms of Fehling's solution. On October 6th I tested his urine and found that it was 1026, and contained *no sugar* and no albumen. On December 6th and December 8th I found it 1027 and 1020 with abundant sugar, and on December 20th the night and the evening urine 1022 with sugar in moderate amount, no albumen. On the latter date I found $\left\{ \begin{array}{l} \text{V. R. c.} + 7.5\text{D} = \text{J. } 6 \\ \text{L. c.} + 7.5\text{D} = \text{J. } 2 \end{array} \right\}$ but this apparent improvement was most probably due partly to dilatation of the pupils and partly to more leisurely testing, for the fundi seemed unchanged, and the lens opacities slightly denser. On Jan. 5th, the urine was 1012 *with*, and again since then 1012 *without* sugar.

Case 3.—Mr. T. S., aged 46 years, an inn-keeper, was sent to me on March 15th, 1887, giving the history that on February 14th, whilst he was in the fields, something seemed to strike his left eye, and everything became double and continued so. Except slight presbyopia he had had no previous visual trouble.

The patient was a well-built, florid man who had had two severe attacks of gout, ten years, and four years before, with occasional twinges at other times. These attacks had left no obvious traces. He had lived well and taken stimulants of all sorts freely. He was married; his wife had had no miscarriages and no children. There was no history or evidence of syphilis. He could give me no details as to his parents.

He was extremely giddy, so much so that unless he covered the left eye he could scarcely stand upright, and was absolutely unable to walk a step. He had got thinner at first, but was making up again. He was much troubled with frontal headache, morning nausea and flatulent dyspepsia. His bowels were not confined. His heart and lungs were normal, arterial tension not increased and arteries healthy. *Urine.*—He was passing about 3 pints of urine. That

before breakfast was 1034 acid, no deposit, no albumen, abundant sugar : that passed about noon was 1036 highly acid, deposit of uric acid, no albumen, abundant sugar. A mixture of equal parts of the above showed 1 gramme of glucose in 15CC., *i.e.* he was passing about 1400 grains of sugar daily. The R. knee-jerk was only just elicited, the L. was absent, but otherwise the motor and sensory functions generally seemed intact. *Eyes*.—The position and movements of the lids were normal. The L. globe was slightly rotated downward, and its inward movement was slightly but definitely deficient, the upward and other movements were good. The R. globe moved normally, and convergence of the two eyes seemed almost or quite normal. There was crossed diplopia, the level, the extent of separation and the inclination of the false image indicating partial paralysis of the left internal and superior rectus. I need not give the details as to this point. The pupils were equal, and normal in reaction to light and with accommodation, V. R. and L. separately $\frac{1}{8}$ c.-1 D Sph. = $\frac{1}{8}$: c. + 2 D J1 well. There was no pathological change in the fundi, and the colour-vision and fields were normal.

He was put on diabetic diet, with general hygienic directions and an alkali and bitter before meals for the first ten days, after which he had no medicine. The sugar rapidly disappeared, for on March 24th, *i.e.*, nine days after seeing me, the medical man estimated the amount by the fermentation test as only 60 grs. daily, and on March 25th there was no change in the specific gravity of the fermented urine. On March 29th the urine was 1025, acid, no albumen, no sugar, and no deposit. He had lost 2 lbs. in weight, but was in every way better.

On April 19th the urine was 1020 acid, no albumen, and no sugar. The ocular movements were now apparently normal, except slight lagging of the L. in movement to the R.; but the diplopia was still present, and the giddiness still very troublesome, relieved, however, by obscuring the lens in the left eye. I thought the L. pupil very slightly larger than the R., but the reactions of both were normal. Both knee-jerks were now absent to careful testing. In May he had a slight attack of aching in the limb joints and loins, with a cayenne pepper deposit in the urine, but no return

of sugar. He was put on Potass. bicarb., with small doses of Potass. iodid. ; was forbidden sugar and beer, and restricted in meat. His medical man reported to me that he soon recovered from his gouty attack, and that gradually during the summer the diplopia and giddiness disappeared. He again, however, indulged freely in alcohol on several occasions, the sugar again appeared, he got depressed and ill, and wasted considerably, his vision "strange and dim," but apparently not diplopic. He had no gouty manifestations, and on limiting his alcohol the symptoms soon disappeared.

I saw him again on February 12th, 1888, he had again exceeded, and had had a "shivering attack." His urine was 1030 acid, no albumen, a doubtful trace of sugar. His vision, ocular movements and fundi were normal. His knee-jerks were absent. In December last he was quite well, and had had no return of eye trouble, diabetes or gout.

Case 4.—W. B., aged 51 years, a tailor, came to me at the London Hospital on August 6th, 1887, complaining of feeling very weak and thirsty, and of his bowels being much confined. His urine was found to be of specific gravity 1038, and to contain a large amount of sugar. He was put on diabetic diet with gluten bread and codeia. During August the sugar still continued copious (sp. gr. 1030), but he felt much better. In September the sugar began to diminish (sp. gr. 1026) and the thirst became less, although he still felt weak and complained also of occipital pain. He was now given iron and quinine, the codeia being stopped but the diet continued. In November the urine (sp. gr. 1022) contained no sugar. It had never contained albumen.

The patient was a very tall, broad-shouldered, stoutish and somewhat florid man. Till the age of 31 he had been healthy, but he then had a very severe attack of jaundice, apparently catarrhal, which lasted some four months, but recovered when he took a voyage to America. Four years later, *i.e.*, at 35, he had a severe attack of sciatica, which lasted three months. He was prescribed "iodide," and got iodism at once, but was no better. It got gradually better when the warm weather came, he believed. Five years later, *i.e.*, at the age of 40, he had a severe attack of gout in his great

toe, and next year a second very severe attack of sciatica, for which he went to Middlesex Hospital, and while under treatment there he had another attack of gouty arthritis, during which the sciatica disappeared. Since that date he has had several slight and some severe attacks of gout. He is quite sure that he passes less urine during an attack of gout.

The patient had not the aspect of a heavy drinker, but he admitted that he drank beer very freely at the date of his first attack of gout, and also spirits, but not to intoxication. His father is alive, aged 85; used to be much troubled with "rheumatics" in his head. His mother died of uterine cancer at the age of 68. One brother suffers from "rheumatic gout," and another has had "rheumatic fever." He knows no one in his family that has had diabetes. He has an epileptic son, aged 26, and a healthy daughter, aged 23. There is no history and no evidence of syphilis.

In 1885 he had slight sciatic pain and severe sacral pain with some arthritis. This recurred in the spring of 1886, and he then noticed that he was passing a large amount of urine, that he was very thirsty, and getting rapidly thinner, "losing pounds a week, and couldn't eat anything, did nothing but drink, as much as a gallon a morning." As he was "block" for fitting clothes, his master spoke of his falling away in flesh. Also he noticed that his trousers got stiff where urine had fallen on them, and this symptom, on looking back, he could be sure had existed as early as 1878, when he first began to have gout and sciatica. After three weeks of this he went to Middlesex Hospital. By this time he had lost three stone, and he was also much troubled with the sacral and sciatic pain. He remembers his urine was "1038." After treatment for a year, taking opium he believes, he felt fairly well, and his urine was "1024"; but on going to Edinburgh he began to take porridge freely, with the result that in July, 1887, he became an in-patient in the Edinburgh Infirmary, with urine "1044" and feeling very ill. Not improving as he believed, he came south in August.

He was to all appearance a sound man when I saw him first. His digestion was good except for constipation. His

skin and mucous membranes were normal. Heart and lungs sound, and arterial tension not increased. The knee-jerks could be only just elicited, but the symptoms on the part of the nervous system were otherwise normal. His vision was excellent and the fundi normal.

After three months' treatment, during which, I believe, he adhered strictly to the regimen and the medicine prescribed, the sugar, as I have said, disappeared from the urine, and the amount diminished to normal. On January 20th, 1888, he came to me with left sciatica and gouty arthritis of the great toe. He was given the bicarb. and iodide of potass., with a purgative and gluten bread. He promptly developed iodism, as he said he should, but the gouty attack passed off speedily under a simple alkali and quinine with diet, and in February, 1888, he was quite well. Last March his urine was natural in quantity, 1025 specific gravity, and contained no albumen, sugar or deposit, and he was better than he had been for the past three years.

It is now tolerably well-known to physicians that under diabetes are included several different types of disease, types possibly as different from one another in their course and pathology as interstitial and parenchymatous nephritis. That the presence of sugar in the urine has various meanings is already to some extent recognised in the partly useful, partly misleading employment of the term Glycosuria. Roberts, in his "Urinary and Renal Diseases," p. 286, says:—"Before the existence of diabetes can be deduced, it must be ascertained that there is a considerable quantity, and not a mere trace of sugar in the urine; secondly and especially, that its appearance is not temporary, but persistent; and, thirdly, that there is a less or greater increase in the volume of the urine." The temporary or intermittent presence of sugar in the urine then, or its presence without the other well-known classical symptoms, should not be termed diabetes, but glycosuria. This is well and good; but if the term glycosuria is taken as meaning anything more than it expresses,

that is, the presence of sugar in the urine, *e.g.*, if it is supposed to mean that the symptom in such cases is of little or no consequence, then mistakes will be made. We are still in almost complete ignorance as to the pathological conditions that give rise to diabetes, but we may say with tolerable certainty that those giving rise to glycosuria must be quite as various in their nature, and even more various in their course and results. Roberts has broken his own rule, and describes these cases as milder types of diabetes, dividing them under three groups : (1) cases differing from ordinary diabetes only in the mildness and non-progressiveness of the symptoms ; (2) cases of glycosuria, temporary or intermittent, without notable thirst or diuresis, emaciation or weakness, apparently arising from mental anxiety or head injury, and terminating in recovery ; (3) a group in which probably all the four cases above recorded might be placed : glycosuria in persons advanced in years, of full habit, often gouty, the symptoms and termination variable. They may be called gouty diabetes for the sake of a distinctive name, although many of the cases never have declared gout in any form. Roberts regards the prognosis in these cases as serious in reference to prolongation of life, even when the symptoms appear amenable to treatment. It is an evidence of general breaking up of the constitution, and they die, he finds, in two to four years from cerebral disease or pulmonary complications. This is doubtless true in the main, but I have recently seen two exceptions to this. One is a gentleman, now aged 73 years, who came under my care five years ago, with failure of strength for over a year and blistering of his great toes in cold weather. His urine was never above 1035 in specific gravity, and the sugar never amounted to more than 235 grains daily. He had never had gout, never showed uric acid or albumen in his urine, and seemed to all appearance a sound man. He was much benefited by dieting, and he has recently had a very success-

ful cataract operation performed, reads J. 1 easily, and is in excellent health, although his urine still from time to time contains sugar. The other exception is a stout old gentleman of 64, who brought his wife to see me, and incidentally mentioned that he had been diabetic for 20 years, and after dieting himself for many years had given up paying any attention to it, and felt as well as he ever did. Considering the absolutely fatal import of albuminuric retinitis, which may be taken as indicating with certainty death within two, and much more probably within one year of its occurrence, it would be of interest to know the prognostic value of diabetic retinitis. There are too few cases on record to answer the question, but Case 1, alive now three years from the onset of symptoms, seems to allow of longer hope in the diabetic than the albuminuric inflammation, while on the other hand I know a case of gouty diabetes in which death from gangrene of a limb occurred six months after the discovery of hæmorrhagic retinitis.

I began by remarking on cases of neuritis and retinitis, for which no obvious cause can be discovered. It will be noted that in the case of James B., several times during his first four months of treatment, and at any time during the past two years, had he consulted anyone for his ocular condition, there would have been no evidence in his urine as to the cause of the affection. An inquiry as to gout would have thrown no light on the question, for he has never had gout, nor has he had a uric acid deposit in his urine except upon one occasion, and that doubtful. The same remark applies to Case 2 and *mutatis mutandis* to Cases 3 and 4, but in these there was a history of gout.

I should therefore urge in all such cases repeated examination of the urine for sugar as well as for albumen, and especially the examination of the evening or after-dinner urine which will often show the presence of sugar when it is absent the rest of the day. Another practical point is that the specific gravity gives no indi-

cation that sugar is absent. In the case of Henry T., a urine of only 1013 specific gravity gave, on two occasions, a copious reaction of sugar, and I have seen this in the case of other patients. I have an impression also that the reduction of the cupric to the cuprous oxide takes place less readily in glycosuric cases, such as we have been speaking of. On several occasions, looking at the urine before it has quite cooled, I have found a well-marked reaction although there was absolutely none when it had been set aside.

(To be continued.)

HERMANN BECKER (München). **MICROPTHALMOS** (Congenital Unilateral). *V. Graefe's Archiv*, Vol. XXXIV, 3., p. 103.

CARL HESS (Mainz). **PATHOGENESIS OF MICROPTHALMOS**. *V. Graefe's Archiv*. XXXIV, V. 3, p. 147.

The eye described by Becker was removed from the body of a child aged five months. At the age of one month, the left orbit contained merely a small white body of about 2 mm. diameter, covered by mucous membrane, and moving with the motions of the right eye, which was normal. This minute globe increased greatly in size till the child's death. At the autopsy, all the muscles of the globe, the levator palpebræ, and the orbital nerves were normal, the muscles, however, being small. The ophthalmic artery was small, and the central artery of the retina was absent. That is, no such vessel entered the side of the optic nerve, but a group of vessels at the under side of the nerve penetrated into the globe.

The globe was nearly spherical, each diameter being about one half that of the corresponding one of the right eye. The horizontal and vertical diameters of the orbit were diminished and its roof flattened downwards. The left opticus was 2·5 mm. shorter than the right, and the left half of the chiasma and left tract thinner than those on the right.

The globe exhibited the following important abnormalities :—

- (1). Absence of the lens.
- (2). No pupil opening, no iris, ciliary body or anterior chamber.
- (3). Coloboma of the retina, pigment epithelium and choroid, and thinning of the sclerotic.

As regards the microscopic examination, there was found no sharp distinction between cornea and sclerotic. The latter was greatly thinned towards the median side of the porus opticus. The choroid was histologically normal, much thickened to the temporal side of the papilla, and absent entirely to the median side over the region of scleral thinning ; anteriorly it ended in a mass of blood-vessels, muscle fibres and nucleated embryonic connective tissue, with no trace whatever of any pupillary opening or crystalline lens. The retina and pigment epithelium were normal, and accompanied the choroid everywhere except towards the median side of the papilla, where the latter was absent, and the former greatly deranged in structure.

The papilla possessed no central vessels, and no physiological excavation ; the vitreous was adherent by bands, which were probably obliterated blood-vessels, to the retina. More minute examination convinced Becker that the retina was not absent, but rolled over on itself at the edges of the coloboma, so that the coloboma was strictly a defect in the tissues springing from the inner wall of the secondary optic vesicle.

The question arises, what stage in development has been reached in the globe under examination ? The condition of the retina and pigment epithelium shows that the primary vesicle had developed into the secondary, but its inversion had not proceeded in normal manner, for no pupillary opening had ever existed. Although Becker admits with Manz that the foetal lens may disappear completely, he believes that no lens was formed in the present case, because if such had ever existed, a pupillary opening must have been produced, unless of course the lens had developed in some other position, and of this he could find no evidence.

He cannot decide with absolute certainty as to whether the introversion of the primary optic vesicle ever took place or not. The causes assigned for this process are various. Manz and Schwalbe attribute it to the presence of the

ectodermal ingrowth which forms the lens. Kessler to an aspiration from within. Kölliker to a manifestation of cell life, not necessarily connected with the formation of the lens.

Becker agrees with Kölliker, but adds that the manifestation of cell activity must take place in the direction of least resistance, and believes that in his case the introversion of the primary vesicle did occur, but that of the ectoderm to form the lens did not, possibly by reason of a defect in the proliferative power of its cells.

This case corroborates the theory that the mesoderm which intrudes with the lens has nothing to do with the formation of the vitreous, for the latter existed without any evidence of the intrusion of the former. The coloboma of the choroid and thinning of the sclerotic Becker is inclined to attribute to the pressure of the duplicated retina.

Hess describes six microphthalmic eyes.

Case 1.—Left eye of a child aged three, sight being normal. Globe nearly spherical—10 mm. diameter—sclerotic, choroid, and retina normal, small coloboma iridis. A process almost as large as the optic nerve itself projected into the vitreous. This was formed by the hyaloid artery with loose connective tissue containing mostly spherical nuclei and few spindle-shaped elements. It decreased in size towards the centre of the vitreous to increase again further forwards, becoming more fibrous in character as it reached the lens. It spread over the posterior capsule as a thick vascular membrane, and passed as a delicate band round the equator of the lens through the coloboma of the iris into the anterior chamber. Here it split into two portions, one of which spread over the anterior capsule, and was directly connected with the iris, and the other turned downwards to unite with the sclerotic and choroid in the position of Fontana's spaces. The ciliary body, otherwise normal, was pushed away from the lens and bent towards the vitreous at the place where the band came in relation to it, and the lens itself was subluxated in the contrary direction. No signs of any inflammatory process were present.

Case 2.—Bilateral microphthalmos, globes essentially alike, of from 12.5 to 13 mm. diameter. The lenses fixed against the ocular tunics in close proximity to the optic

nerves. The sclerotics normal except that they were bulged outwards where the lenses lay. Large colobomata of the iris, and of the choroideæ and retina. Connective tissue bands sprang from the lower border of the optic nerves and ran forwards along the sclerotics to about 2 mm. from the papillæ, where they pierced the walls of the globes and proceeded to unite themselves with the posterior capsules of the lenses. The central portions of these bands were closely united to the sclerotics as far forward as the ciliary region, while the lateral portions separated from the sclerotic so that the retina were interposed at both sides. The details of this differed slightly in the two eyes.

Case 3.—Bilateral microphthalmos in a prematurely born child; the eyes were from 7 to 10 mm. diameter. The left (larger) eye possessed a normal sclerotic and well developed choroid. Retina mostly detached, cornea resembling sclerotic, vitreous much shrunken and pierced by a band of fibrous tissue surrounding the hyaloid artery, forming the capsule of a dislocated, irregularly-shaped and cataractous lens, and proceeding forwards into the anterior chamber to join the corneo-scleral border. Its anterior portion contained hyaline cartilage.

The right eye showed a scleral ectasia below the porus opticus, from whose anterior border a cicatricial-like thickening of the sclerotic ran forwards towards the corneal margin where it bent backwards under the lens into the vitreous. It also here contained some cartilage. A band like that in the other eye ran from the porus opticus into the vitreous and united with the tissue just described.

Case 4.—The right eye of a man aged 53 belonged to a different category from the preceding, and need not be described.

The other cases exhibited the following two characteristics. Firstly, no sign whatsoever of past or present inflammation; and secondly, a union between the vitreous and the outer tunics of the secondary optic vesicle effected by means of a tissue nourished by the hyaloid artery, or a representative of that vessel. The shape and position of this tissue differed slightly in the various cases and also its

histological character in unessential details. Hess cannot regard it as being in anywise an inflammatory product, but considers it to be the result of an atypical embryonic development of the intruded mesodermic layer, which goes to form the vitreous.

He refers to other published cases which resembled these in important respects, and to which he is inclined to attribute a similar causation. The connective tissue band formed in these microphthalmic eyes may possibly be related to the Funiculus Scleræ described by Hannover, and shown by Rothholz to be the permanent representative of a structure existing in foetal life.

These views of Hess, if sound, give a considerable blow to the theory advanced by Deutschmann to account for coloboma of the iris and choroid and so-called arrests of development in general, viz. : an inflammatory disturbance of the tissues during foetal life. Deutschmann's paper appeared in the *Klin. Monats-Blätter*, in March, 1881, and is based upon the observation of a case of bilateral coloboma of iris and choroid in a rabbit. From his description, it is hardly possible to regard the appearances as caused by anything else except an inflammation implicating sclerotic choroid and retina, and binding all three tissues in a cicatricial union ; but the absence of any such inflammatory appearances in Hess's cases renders such an explanation impossible for them at least, and inferentially improbable for the larger number of cases which have been published of similar "arrests of development."

J. B. S.

SCHUMDT-RIMPLEB (Marburg). Hemianopsia from Cortical Lesion with secondary degeneration of Optic Nerve. *Archiv f. Augenheilk.*, Bd. XIX. Heft. 3.

The author, in his very interesting paper, details the results of the examination of one optic nerve from a case in which well-marked hemianopsia came on soon after a head injury and lasted during the five subsequent years of the patient's life.

A brief account of the case was given at a meeting of the Marburg Med. Soc. in 1882, by Roser and Schmidt-Rimpler,* and at the same Society, in August, 1888, Marchand gave a description of the microscopic appearances of the brain, and mentioned that the results of microscopic examination would be published subsequently. The value of Schmidt-Rimpler's present communication would have been enhanced by even a brief account of the conditions revealed by the microscope in the path of the visual fibres above the chiasma.

On February 22nd, 1882, the patient, a man *æt.* 33, sustained a compound comminuted fracture of the posterior part of the right parietal bone, a few centimetres below the sagittal suture. The next day, after admission to hospital, the skin wound was enlarged and several splinters of bone removed. The dura mater was found to be lacerated over an area the size of a five-pfennige coin. Everything went well till April 21st, when he became unconscious. A fistula at the site of wound was re-opened, a cerebral abscess incised and a tablespoonful of pus let out. Consciousness then returned. On the 21st of May another attack of coma supervened, with left hemiplegia. A large-sized prolapse of brain tissue through the wound was, on two occasions, snipped off with scissors. By the end of May the hemiplegia had almost disappeared, leaving only a feeling of weakness in the left arm.

The patient, when he recovered consciousness after the accident, noticed that the sight of his right eye was defective. His left eye had been wounded in childhood, and showed a large adherent leucoma. The field of vision of the *right* eye was measured on the perimeter on July 14th, and the chart, of which a woodcut is given, showed a nasal hemianopsia. The dividing line between the seeing and blind halves of the field was situated between 5° and 10° to the nasal side of the fixation point; central vision was thus retained and was of normal acuity. The temporal limits of the field were normal both for form and colour. During the next five years the visual field was mapped out on several

* Cf. Berlin Klin. Woch, 1883, No. 32.

occasions, but no change occurred in its boundaries. Light sense, measured with Förster's photometer, was unimpaired. No ophthalmoscopic changes were present at first; during the following years a small portion of the lower periphery of the optic papilla became noticeably paler.

The patient returned to his work and remained well. His memory was rather weaker than formerly. Hearing was good, though in the right ear not quite so acute as in the left, and there was catarrh of the right middle ear.

In February, 1887, symptoms of lung disease appeared, and he died in the following September.

At the post-mortem the brain, with the bone at the site of fracture, was removed in one piece. The *left* O. N. was thin and flat, and had evidently undergone a centripetal atrophy. On section of the *right* O. N., at the foramen opticum, there was a noticeable difference in colour between the peripheral and central parts. The left optic tract was considerably smaller than the right.

The following brief description of the condition of the brain is taken from that given by Prof. Marchand. "In the posterior part of the right parietal bone is an area 4 cm. in length over which the bone is replaced by firm cicatricial tissue, adherent to the brain. The right hemisphere is about 3 cm. shorter than the left, in consequence of wasting of the right occipital lobe. The anterior limit of the atrophied area lies about 2 cm. behind the interparietal fissure, and its posterior limit was about 1.5 cm. from the apex of the occipital lobe. Almost the whole of this lobe was occupied by scar tissue; only the apex appeared unaltered. The posterior cornu of the right lateral ventricle was much dilated and distorted."

The right O. N. (hardened in Müller's fluid and alcohol) was examined in cross-sections from the foramen opticum to the bulb; only a very small portion close to the foramen was divided longitudinally. Weigert's method of staining was chiefly employed, and by this means the atrophied fibres were easily distinguished. The position of these fibres, derived from the uncrossed bundle of the right optic tract and supplying the temporal half of the retina, varied considerably during their course through the orbital portion of the nerve.

Near the foramen they occupied a narrow sickle-shaped area, which extended half way round the nerve, and was so placed that the middle of the sickle lay below and towards the nasal side: its outer end reached to the lower border of the temporal side of the O. N., whilst its inner end extended nearly to the upper surface of the nerve (*cf.* Pl. IX., Fig 1, in the original). Nearer the eyeball there was a change of position: the sickle-shaped area (at the entrance of the arteria centralis) was divided into two parts by a wedge-shaped extension of healthy nerve fibres, which reached to the lower-inner border of the nerve. Still nearer the eye this wedge became wider, so that at the exit of the retinal vein there was a broad band of healthy fibres extending obliquely across the nerve and bordered above and below by a rim of atrophic fibres. This position was retained by the degenerate fibres as far as the bulb, with, however, a slight increase of both the upper and lower areas towards the temporal side of the nerve; the oblique band of healthy fibres remaining widest at its outer end.

Unfortunately the author has not given us any account of the microscopic appearances of the blind half of the retina, but has merely stated that, in sections of it, there were large globular deposits with dark contour among the atrophied bundles of fibres.

If we compare the results obtained by Schmidt-Rimpler regarding the position in the O. N. of the fibres destined for the different parts of the retina, with those of previous observers, we shall find that they are by no means completely in accord, especially with reference to the macular fibres. It must be remembered, however, that not only may there be individual differences in the anatomical position of the several sets of fibres of which the O. N. is composed, and of the relative size of these bundles, but also that it is extremely difficult to determine with mathematical precision the superior, inferior and lateral surfaces of such a structure as the optic nerve.

A reference to the plates in the author's paper will enable the reader more clearly to understand the above description.

J. B. L.

**FONTAN (TOULON). The Pathological Anatomy of
Keratitis Punctata.**

Recueil d'Ophtal. Nov., 1888.

Our knowledge of the anatomical lesions in keratitis punctata, and of the irido-choroiditis of which it is ordinarily a symptom, is comparatively recent, and still incomplete. It was for long believed, as stated by Sichel, that the seat of this affection was in the posterior layers of the cornea. The old name, "aquo-capsulitis," indicated an inflammation of the lining membrane (compared to a serous membrane), of the anterior chamber. Schweigger* first described the characteristic punctate collections of cells on the posterior surface of Descemet's membrane, and concluded that the corneal epithelium (posterior) underwent a morbid proliferation. Ivanhoff† has given a good description of the exudation on Descemet's membrane, and considers that the cell elements are the products of this layer.

Knies‡ also has studied this condition, but hesitates as to the origin of the cells deposited in the anterior chamber.

Fontan having recently examined two eye-balls affected with keratitis punctata, writes at some length on the pathological anatomy of this disease. His first case gave him but little information; the eye was removed from a cadaver with advanced post-mortem changes. "Serous iritis," with "keratitis punctata," had been diagnosed during life. Examination of the cornea revealed small deposits of cells forming tiny grumous clusters on the posterior surface of Descemet's membrane, in their usual triangular arrangement. Each cluster consisted of a granular material containing cells thought to be altered leucocytes. The corneal tissue was healthy, the elastic lamina intact, and the epithelium normal.

His second case was of greater interest. The eye,

* Schweigger, Handbuch, 1873.

† Græfe-Sæmisch, Vol. ix.

‡ Knies. Arch. für Augenheilk., Vol ix.

enucleated by Galezowski, was affected by traumatic iridocyclitis with keratitis punctata, and had excited sympathetic ophthalmitis in its fellow. The globe was of normal size and consistence, and presented no trace of wound. When bi-sectioned it was seen that the anterior chamber was filled by a white coagulum, consisting apparently of fibrin; the crystalline lens was *in situ*; the vitreous body was also completely "coagulated"; no detachment of hyaloid or retina, no ossification of choroid.

Microscopic Examination.—The cornea, of normal thickness and contour, was free from scars. Its substance appeared healthy. The anterior epithelium was, in general, normal, but a few small phlyctenules were evident; at these points this layer was raised and separated from Bowman's membrane over an area measuring about one mm. The latter membrane was unaltered in structure, but slightly depressed beneath each phlyctenule, the depression including the most superficial lamellæ of the corneal tissue. In the spaces thus formed between the epithelium and its basement membrane, was a granular exudation containing a few leucocytes. There were no visible vessels or nerves in the immediate neighbourhood of the phlyctenules nor any cellular proliferation. The membrane of Descemet was healthy-looking, and took no part in the characteristic changes on its posterior surface. These phenomena consisted in the production and heaping up of cells which seemed to adhere to the posterior epithelial layer; they were conical in shape, and likened to small gravel hillocks. Their component parts seemed to be cells and granular particles, which latter perhaps played the part of cement; *quoad* the cellular elements, some were well formed and evidently young and active, but the majority were deformed, angular or crenated. The author thinks they were undoubtedly migrated and altered lymph corpuscles, and, therefore, not a product of the posterior corneal epithelium. Between the clusters was a thin layer of similar structure, but containing no epithelial cells. The posterior corneal epithelium was undisturbed, and in section showed no proliferation. At certain points the cells in the mounds were agglutinated to those of the epithelium, and the latter appeared somewhat altered.

The exudation either in its punctate arrangement, or in the form of a layer, extended as far as the iris-angle, and thus did not strictly conform to the usual limits of a keratitis punctata. Another argument contrary to the idea that the collections of cells were proliferations of the epithelium, was the presence of similar cells on the anterior surface of the iris, and also on the anterior capsule of the lens. Indeed, it might be said that the anterior chamber was lined with these cellular elements, more or less grouped. The anterior chamber was filled by a coagulated fibrinous exudation, the appearance of which varied somewhat. A narrow zone, near the cornea, was hyaline and translucent, it was coloured yellow by picric acid, and was insoluble in ether, acids, and liquor potassæ, and Fontan believes that it was composed of fibrin, or one of its derivatives. In this translucent zone were situated the groups of cells above described, and its thickness was in direct proportion to their height. Posterior to this zone the coagulum was finely granular, and in the layers near the iris it became fibrillated, the fibrils having a stratified arrangement like the clot in an aneurismal sac.

The author holds that the anterior chamber was filled by fibrin, but that the anterior portion of the mass having suffered some unknown change due to the presence in it of the cell groups, had not coagulated quite like the remainder, hence its hyaline appearance.

The iris was in a state of intense inflammation and greatly thickened, especially near its root, where it encroached upon the angle of the anterior chamber. The anterior lens-capsule was intact, protruding somewhat into the pupil, and on it were cell groups similar to those on the cornea. The canal of Petit was filled by fibrinous exudation, and a stratified coagulum was visible between the anterior part of the choroid and the hyaloid membrane. The ciliary body presented in general the same appearance as the iris, but was rather less infiltrated. The ciliary muscle appeared atrophic. The choroid anteriorly was apparently but little altered, but in its posterior half there were numerous patches in which this tunic was slightly thickened, and contained much dense connective tissue with few vessels and little pigment. The chorio-capillaris was scarcely at all altered, and the lamina vitrea, and the hexagonal pigment layer, were intact.

At the site of the disseminated patches of choroidal inflammation and thickening, the retina had suffered more or less severely, and in some places had become separated from the choroid. In the inner layers of the choroid at these points, there were some greatly dilated vessels, filled with blood, which pushed the lamina vitrea and the hexagonal pigment inwards; and on the inner surface of the latter, between it and the retina, was a thin finely granular layer, in which the rods and cones were imbedded. The optic nerve exhibited a certain degree of atrophy, and the *arteria centralis*, as well as some of its branches, were blocked by a fibrinous clot, which presented a laminated structure, was soluble in ether, and was evidently old.

The author concludes by remarking :—"Keratitis punctata, so-called, is not essentially a keratitis, for the cornea is, of all the ocular structures, that which is least affected, and its changes are in fact secondary to the inflammation of the vascular tunics of the eye." The condition he thinks is in reality a sero-fibrinous, or, as he prefers to call it, sero-purulent iritis.

It must be remembered, however, that the case he has so carefully examined and described, was one of sympathetic ophthalmitis, and it is not altogether improbable that the pathological changes in cases not of sympathetic origin may exhibit important differences from those set forth in this paper. We have, as yet, but scanty knowledge of the exact pathology of this non-sympathetic keratitis punctata, and, therefore, it would be rash to accept the author's description as entirely applicable to such cases.

J. B. L.

E. FISCHER (Berlin). Visual condition of an Eight-year-old Child after removal of Total Congenital Cataract. *Klin. Monatsbl. f. Augenheilk.*, December, 1888, p. 461.

The writer has collected from ophthalmic literature eleven records of the same kind as his own, namely, of persons affected with total congenital cataract who, after some years of blindness, have received their sight through operation.

Five of these belong to the pre-ophthalmoscopic period, six to later times. A comparison of these records shows that children thus affected, although entirely without perception of form, usually have, in respect of bright or shining objects, a more or less well developed perception of direction, and even, when the object is within a foot or two of the face, of distance.

The degree to which this perception is developed depends to a considerable extent upon the intelligence of the child, and may of course be very slight, but it usually enables the patient, after the removal of the cataract, to rapidly acquire correct ideas of the position of the objects pictured on the retina. With regard to form, the case is different. Objects intimately known through other senses, remain entirely unrecognised, though correctly pictured on the retina, until the impression has been many times received, carefully compared with those received through other senses, and committed to memory.

The case now described was observed in the clinic of Professor Schoeler. The child, a girl aged eight, had a complete soft congenital cataract filling the area of each pupil. Fingers were not recognised ; pupil-action, projection, and light-perception were good. There was no strabismus and no nystagmus.

Both lenses were removed at the same time. When examined on the eighth day the pupils were free, the media clear and each fundus healthy. The bandage was discarded and the child permitted to use her eyes for the first time. This may be called the first day of vision.

Second day.—Placed with her back to the window she opened her eyes freely and directed them properly towards objects placed before her, when her attention was sufficiently excited. For this purpose bright and shining objects answered best. Both eyes fixed properly, without oscillation, but very soon the effort of attention ceased and oscillatory movements from side to side began ; these were again suppressed when fresh objects were placed before the eyes, various things such as an apple, plum, egg, bread, fork, and her own doll were placed before her. She recognised none of them until she touched them with her fingers. She watched attentively the movements of a large cat, but had

no conception what the appearance meant until the touch of her fingers explained it, to her great delight. The movements of a candle in a darkened room were correctly followed by both eyes with perfectly co-ordinate movements.

Third day.—When shown the same objects as on the previous day she failed to recognise any of them, and when told to select from a similar series in her lap a thing like the one held before her, she made great mistakes as to size. Several colours were recognised and named correctly. In moving about the room she appeared to be less dependent than on the previous day, upon the sense of touch, but she walked against every piece of furniture in her way. When taken into the garden on the following day she stood astonished before a tree, and had no knowledge of its nature until she touched it.

It is unnecessary to follow, with the writer, the gradual development of visual recognition from day to day. At the end of three weeks she had learned to recognise rapidly all the common objects around her, to play freely with other children, guiding herself by sight, and to puzzle out the meaning of pictures of things already known in reality, and to appreciate the help of correcting glasses.

In summarising the results of these observations the writer emphasises the statement that, with regard to the sense of form, the child was previously completely blind, whereas with regard to direction, and, in lesser degree, distance, there was already a certain degree of development, depending on the power of correct fixation and co-ordinate movement.

P. S.

G. ABBOTT (Tunbridge Wells). Test-types for the use of School-teachers. *London, Pickard and Curry.*

PRIESTLEY SMITH (Birmingham). Eye-sight and School-work. A printed sheet, with illustrations: to be hung in class rooms. Prepared at the request of the Birmingham School-Board. *The Midland Educational Co., Birmingham and Leicester.*

ERNEST E. MADDOX. A Suggestion for the special Education of Short and Weak-sighted Children *J. W. Sargeant, Peterborough,*

These three publications have the same object in view, viz., the prevention and diminution of the evils which arise from improper and excessive use of the eyes during school-life.

The purpose of the new test-types is to enable school teachers to test the vision of their scholars in a systematic manner. If this were carried out once in each year in every school, cases of imperfect sight would be detected at the outset and much future mischief might unquestionably be prevented. The difficulty is that the work of the teacher is already sufficiently onerous, and that the proposed testing, if it is to give useful results, must involve both care and time. With regard to the instructions which accompany the test letters, we think that they aim rather too high. No uninitiated person can teach himself from so brief a statement, the principle of Snellen's test-types, and the expression by means of a fraction of the acuteness of vision; nor could the nature of myopia, hypermetropia, and astigmatism be understood from the few words here given. If the school-master will undertake to ascertain which of his scholars can read certain letters at a certain distance, and which cannot, he will have carried *his* diagnosis as far as is really necessary. The fault is, however, on the right side, and we have no doubt that these hints to teachers will be very useful in drawing attention to the evils in question.

The large printed sheet prepared for the class-rooms of

the Birmingham Board Schools contains the following seven rules, printed in large type : 1. Sit upright, sit square. 2. Keep your eyes at least twelve inches from your work. 3. Write on a slope, not on a flat table. Read with your book placed well up ; do not lay it down flat. 5. Do not read very small print. 6. Do not work in a bad light. 7. If you cannot see your work properly, tell your teacher. Good positions and bad positions are illustrated by four drawings of a school-boy reading and writing ; these are enlargements from some of those which were published in the *Ophthalmic Review* for June, 1886. At the foot of the sheet are twenty-four lines in smaller type addressed to the teacher in explanation and amplification of the rules. The object of the sheet is to keep the matter constantly before the eyes of teachers and scholars. The author had occasion to report to the School Board that in certain of the schools bad positions were not merely permitted, but were actually compelled by the teacher, who, when the writing lesson began, gave the general order "heads down," and expected every scholar to adopt the very position which the oculist forbids. The teacher's object is to prevent the boy copying from his neighbour, but this end, however desirable, was not held by the Board to justify the means, and the present publication is the result.

The author of the pamphlet on short-sighted children points out that, while many proposals have been made to *prevent* short-sight in schools, scarcely any special provision appears to have been made for children who are *already* short-sighted. The scheme of education advocated is one in which the strain of eye-work would be reduced to a minimum. Books would be banished ; there would be, instead, lectures, demonstrations, mental arithmetic, educational songs, diagrams, charts and maps upon the walls ; and in the evening, luminous devices on a wall or screen. By the last named means almost anything could be taught, even to geometry, mathematics, history, spelling, reading, geography, and natural history.

The author believes it would be found, that children so taught would have their faculty of observation quickened and would be likely to surpass in intelligence those engrossed in

books. The concentration of the child's attention would unquestionably be furthered by the use of the magic lantern; where preferable, large printed sheets placed upon the wall and illuminated through a bull's-eye might be used instead. For arithmetic and algebra the writer has designed an apparatus which permits a ready printed sum on a large wall-sheet to be uncovered, figure by figure, as the class works it out.

Writing, ciphering, and drawing, which *cannot* be taught at a distance, would be carried on in limited amount and under the carefully regulated conditions which have been laid down in works on the hygiene of the eye.

To the very natural objection that when the boy leaves school he must use books, the author properly replies that the critical time will then be past, the eyes will bear more work without danger, and the scholar will have acquired the wisdom to use them properly. His scheme is not likely to find a full realisation at present, but the need for such special methods of teaching as he advocates has long been felt and is increasing. We cordially recommend his pamphlet to the notice of those who are interested in the subject.

It is probably known to many readers of this review that Dr. Doyné, of Oxford, has already taken some practical steps in the direction in question.

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SOME OCULAR AND NERVOUS AFFECTIONS IN DIABETES AND ALLIED CONDITIONS.

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(Continued from p. 45 Feb., 1889.)

In the first portion of this paper I have recorded several cases to which I shall have to refer in my subsequent remarks. I also endeavoured to emphasize certain practical points in regard to the repeated examination of the urine for sugar as well as for albumen in apparently unexplained cases of disease of the fundus oculi. These remarks apply also, I believe, to some cases of neuralgia and neuritis in the general system.

Before commencing the immediate subject of this part of my paper, as an example of how some cases of diabetes fluctuate, I may record the continuation of Case 4 during the present month.

Case 4 (continued).—W. B., it may be remembered, saw me last in July, 1888, and for eight months previous to this he had had no sugar in his urine, and had felt in excellent health, had not suffered from gout or from sciatic pain. He called upon me on February 5th last, and told me that during the past eight months he had been at Brighton and had continued in excellent health, actually gaining flesh, and having no symptom of diabetes. He took no sugar, no potato, no pudding or sweets, a glass of ale with dinner and supper, and chiefly meat and green vegetables with brown

bread. On January 22nd, *i.e.*, a fortnight before his visit to me, from no cause that he knew, he noticed that he had slight thirst and some frequency of micturition. This passed off, however, and not taking the warning, while visiting a relative in London, on February 3rd, he ate heartily of currant pudding. Extreme thirst, great frequency of micturition, and his old pain in the hypogastrium returned that afternoon and persisted. The urine he passed during his visit was 1040, acid, contained no albumen, but sugar in the proportion of about 30 grs. to the ounce. He had no additional ocular or nervous symptoms. He is again, of course, on diabetic diet and treatment, which he had relinquished without permission.

It is not my intention, I need hardly say, to discuss systematically the ocular and nervous disorders that occur in diabetes. Anyone wishing to consult such an account I would refer to Dr. Ross's admirable enumeration and description of them in the second volume of his great work on "Diseases of the Nervous System," p. 933. My object is to put together certain cases that have occurred in my practice which illustrate some special points either of theory or practice, not always confining myself to ocular and nervous symptoms. Let me first say a word on what is almost invariably the first symptom of diabetes, appearing before the thirst and frequent micturition, the hunger and constipation are at all marked—*viz.*, a sense of weariness and languor, with a soreness across the loins and hips, intensified, soon after a meal containing sugar or starch, into an absolute inability to move or exert themselves in any way. Symptoms resembling this may be due to ordinary hepatic dyspepsia, but they should in all cases suggest the necessity for an immediate examination of the urine. The symptom is especially marked in a young married woman, aged 28 years, at present under my care, suffering from classical diabetes. For two and a half years she has

been passing from three to five pints of urine, with latterly 1 grain of sugar in 1·2 CC of urine, which for five pints gives 2,460 grains of sugar daily. It is but slightly diminished by the strictest diabetic diet, and no medicinal treatment has made the slightest difference in it. She speaks slowly and languidly, with now and then a bright flash of what had evidently been her natural manner. After allowing herself to be persuaded to take sugar or sweets of any kind, even in small amount, she feels "as if she must go to sleep." She has the usual symptoms, has, as is generally the case, lost sexual feeling, and has had the pruritus vulvæ so common in diabetic women, and the dry eczematous condition of the vagina, from which alone my colleague, Dr. Lewers, tells me he has over and over again diagnosed the diabetic cases he sends me from his out-patients. This eczema and pruritus, although now moderately well known to medical men, is, I venture to think, not sufficiently well known. Every now and again one sees a note in the medical papers written in desperation to ask help in a chronic case of pruritus vulvæ. Where there is no mention of the urine, one may assume with considerable probability that the practitioner is unaware of this common cause of the condition. It is still less known that a similar eczema and pruritus attacks, although much less frequently, the glans and prepuce of the male, sometimes inducing phimosis. The eczema, as Fagge says, is most probably due, not to irritation by the sugar, else it would be more frequent, but to altered nutrition of the parts, a trophic change similar to that which occurs in the skin, making it dry and harsh; in the tongue, making it bare and beefy; and also probably in the crystalline lenses, inducing soft, nuclear symmetrical cataracts, any one or all of which symptoms, however, may be absent even in severe diabetes. My friend and co-editor, Mr. J. B. Lawford, recently sent me a diabetic man, aged 62 years, suffering from conjunctivitis, for which no evident reason

could be discovered. The affection was comparatively slight in the right eye, very severe in the left, with much pain and œdema, no purulent secretion. His urine, examined, was found to be of specific gravity 1040, with no albumen, but very copious sugar. Under diabetic treatment the urine fell at once to 1018, and the inflammation rapidly subsided, with practically no local treatment. Was this a case of diabetic conjunctivitis? I do not venture to express a dogmatic opinion. It is, however certainly not a common symptom in diabetes so far as I have observed. With diabetic iritis I am not familiar, but it occurs apparently not infrequently, and its frequent occurrence after cataract operations in diabetics is one of the reasons why surgeons are chary of interfering with diabetic cataract. Hirschberg, however, in a paper on Visual Disturbances in Diabetes (Deutsch. Med. Wochenschr. 1887, April 28, *et seq.*), states that he, as well as A. v. Græfe, has operated in diabetic cataracts even at an advanced stage of the disease, with results equal to those in simple cataract, although in many of the cases iritis took place.

It should be well borne in mind that diabetic cataract is not necessarily symmetrical nor necessarily progressive. Indeed, Nettleship, in the Ophth. Soc. Trans. vol. v., p. 107, has recorded cases in which the lens opacity disappeared. Such cases must, however, I imagine, be extremely rare. Cataract occurring in old people who happen to have slight glycosuria is, of course, not diabetic : it is unsymmetrical, generally more or less capsular, and matures slowly ; and, apart from the fact that the tissues of such people are deteriorating, these cases may be operated on with much the same prognosis as others.

In last number I recorded two cases of diabetic retinitis, Cases 1 and 2. Neither of these, it will be noted, shows what is considered the most characteristic feature of diabetic retinitis, viz., hæmorrhage into the vitreous. The vitreous is perfectly clear throughout

in Case 1, and, so far as can be made out, also in Case 2. I notice that Hirschberg, in his paper quoted above, also records no case of vitreous hæmorrhage, and the same applies to three cases recorded by Nettleship (*Ophth. Soc. Trans.*, vols. ii., p. 51; vi., p. 331; and viii., p. 159). Indeed, oddly enough, there is no case of actual diabetic vitreous hæmorrhage recorded in the *Ophth. Soc. Trans.*, although in the first of Nettleship's cases the presence of cholesterine scales in the vitreous may indicate old hæmorrhage. It is possible the peculiarity has received a little too much prominence. I need not recapitulate the ophthalmoscopic appearances presented by the two cases. In Case 1 most observers would, I think, at once exclude albuminuric disease, the differences between the two being, I should say, fairly marked but the nature of Case 2 could not, I believe, have been diagnosed from the ocular condition. In both cases the discs and vessels were, to all appearance, normal, no evidence of thickening or aneurysm. Blurring of the disc, positive neuritis, and also primary atrophy of the discs have all been described in diabetes. Dr. Stephen Mackenzie, in the *Ophth. Hosp. Reports*, 1876-9, vol. ix, p. 134, records a case of glycosuric retinitis with autopsy, and an examination of the eyeball by Mr. Nettleship. In this case there was evidence of repeated hæmorrhages into the vitreous of each eye, much hyaline thickening of the arteries, such as Dr. Mackenzie has described in pyæmia and other blood diseases, and also many minute aneurysms projecting as pouches from the side of the capillaries. The case, from the completeness with which it is recorded, both clinically and pathologically, may be regarded as classical.

Many clinical facts go to show that gouty arthritis and diabetes mellitus are in certain cases merely transformation symptoms of the same diathesis, not present at the same time, but the one taking the place of the other. Cases 2, 3 and 4 illustrate this fact, and for an admirable discussion of the whole question I would

refer the reader to Fagge's account of Diabetes in his work on "The Principles and Practice of Medicine," vol. ii., p. 411. Diabetic patients, even those whose urine is normal in amount, rarely discharge much uric acid—that is to say, when they are actually diabetic; at other times there may be a copious deposit in a highly acid urine. Dr. Pavy has noted that dyspeptic symptoms frequently disappear when diabetes sets in. "These facts," says Fagge, and others that he mentions, "indicating that lithæmia and diabetes are inversely correlated, are interesting not only in themselves, but also because they afford further evidence of the correctness of the views which regard both these diseases as disorders of the hepatic functions. No other theories of their origin would account for the existence of a relation between them."

I have already stated my belief that we are profoundly ignorant of the pathology of diabetes, both its classical and its aberrant forms. In our consideration of these we have almost certainly been too much dominated by Claude Bernard's brilliant discovery of the "diabetic centre" in the floor of the fourth ventricle, puncture of which will, it is said, induce diabetes. The fact undoubtedly holds that a lesion of this area will induce temporary glycosuria, destruction of the governing vaso-motor cells allowing a paralytic dilatation of the hepatic artery and its branches; but inferences from this fact should be received with "slow-consenting academic doubt." Let me illustrate what I mean by this doubt. We believe that every part of the body, the liver included, is represented in its simplest and most automatic combinations in the lowest nerve centres, the spinal cord and its continuation upwards into the brain; that every part, however, the liver included, is re-represented in more complex and less organised combinations in the middle motor and sensory centres of the cortex; and, lastly, some of us believe with Dr. Hughlings Jackson, that every part of the body, the liver included, is

re-re-represented in its most complex and least organised combinations in the highest motor and sensory centres of the cortex, in the anterior and posterior parts of the hemispheres, the part of the brain more properly termed "the organ of mind." Appropriate stimulation, which for the highest centres we have not yet discovered, of these various centres will induce corresponding peripheral changes, these changes indicated by actions more or less imitating those naturally induced by the ordinary action of these centres. Similarly destruction of any one of these centres will mean over-action of lower uncontrolled centres. This is the plan of the nervous system, a plan of local government with central and imperial control, evolved in long past ages. Now a gross injury to a part of the lowest centre representing the liver induces a rapid discharge of sugar from the liver; but this is only a glycosuria: we are still a long way from diabetes. In a very few hours the liver is exhausted of glycogen, and the discharge of sugar ceases; the clock has simply run down owing to the pendulum being taken off. As Fagge points out, we must have an increased formation of glycogen in the liver, as well as a more rapid outflow of sugar from it, in order to constitute true diabetes. This, he considers, would entirely explain the pathology of diabetes. And it does go so far in the direction of explanation; but Fagge seems to conclude that the whole is a matter of liver and liver cells, and in this I cannot agree with him. The liver cells are the real lowest level of evolution, and in glycolysis, that part of the life-work of the liver with which we are at present concerned, these cells have a most important part to play, viz., the selection from the portal blood of its saccharine, and partly also its nitrogenous constituents, with a view to their transformation into glycogen, also the storage of this material within their recesses and the gradual redistribution of it to the blood. This is an important, one might say an active work, and in those morbidly

hurried and over-driven processes which constitute diabetes, the liver cells must be equally concerned, must share in the hurry, and must suffer by it doubtless. But from what we know of structure and function, the work of the liver cells is lowly and automatic, carried on under the control of nervous structures local and central. Immediate interference with their work is capable of producing great disorder in the system, such, for example, we may suppose as are felt in hepatic dyspepsia. But are the disorders of function which, by the above explanation, apparently constitute the pathology of diabetes, such as would naturally arise from direct interference with the liver cells? It will be noticed that the explanation implies both defect and excess, both paralysis and stimulation, under-action and over-action together and at the same time. This is unlike a lesion on the lowest level of evolution, but it is very like a lesion in the higher levels. In such lesions we always have this combination. We are not theorising without a definite experimental fact to keep us from going astray. Claude Bernard's result marks the way by which we must pass. The immediate effect of a coarse acute lesion, such as puncturing the floor of the fourth ventricle, bears to the effect of a slow nutritive change in nerve cells somewhat the same relation as the immediate results of section of the spinal cord have to those of a chronic transverse myelitis. In the first case we see only defect, paralysis; in the second we have both defect and excess, both paralysis and rigidity with uncontrolled action. The parallel seems a close and instructive one, and we may venture to regard the rapid outpouring of sugar from the liver in diabetes as a paralytic phenomenon, while the increased glycogenesis is a superpositive uncontrolled action, the lower centres having obtained home rule as we may put it. This diabetic glycogenesis, it will be noted, is not only abnormal in amount, but it is also random in nature, like the jerkings and rigidity of spastic paraplegia—that is to say,

it is liable to exacerbations out of all proportion, as might be said, to the stimulus. As Pavy has pointed out, in some diabetics a small quantity of sugar will act like a poison, inducing a copious excretion of sugar in the urine for months. In other ways also it is altered from healthy glycogenesis, *e.g.* in its increased transformation of nitrogenous material as shown by the excretion of urea and by the body wasting. This combination of excess and defect of action in diabetes, each in varying degree in different cases, probably explains the extreme variety of diabetes and its appearing in forms which produce so different results and react so differently to our known means of treatment.

I have ventured thus far to enter on this theoretical discussion of the physiology of diabetes, as it has some bearing on the remarks I have still to make. I shall not, however, enter on the actual ætiology of diabetes in any detail. Let me relate here two cases partly bearing on this question of ætiology, and partly introducing the question of the nervous affections occurring in diabetes. The first is a very ordinary case. I relate it chiefly for contrast.

Case 5.—Richard D., æt. 56 years, a traveller in the shoe trade, was admitted on August 21st, 1886, under the care of Dr. Charlewood Turner, into the London Hospital, where I had an opportunity of seeing both this and two cases of Dr. Hughlings Jackson's, which I have been permitted to use. The patient was suffering from right hemiplegia and diabetes. He had been a very intemperate man, and 20 years before had had a chancre followed by iritis. For six months he had suffered from frequency of micturition, and during this time he had lost 1 stone 9 lbs. in weight. Three months before admission he had suddenly lost consciousness, and when he came to himself, he found he had lost the use of his right side, and that his articulation was very defective, there being, however, apparently no true aphasia.

When admitted he had almost wholly recovered the use

of his right hand, the grasps being almost equal. He had also recovered the use of the leg so far as to walk fairly well, lifting the foot high from the ground to clear the toe. The right knee jerk was slightly exaggerated. He had no loss of sensation when admitted, and the ocular movements and fundi were normal. His urine varied considerably, but was always copious, from 5 to 7 or even 9 pints daily. It was 1030 to 1035 spec. grav., contained no albumen, but always sugar, varying from 5 to 7 per cent.

He was dieted and also treated medicinally, but he left the hospital on November 2nd, 1886, in very much the same condition as when he was admitted.

Case 6.—Jonas B., æt. 59 years, a porter, was admitted on December 1, 1885, into the London Hospital under the care of Dr. Warner, and was subsequently transferred to the care of Dr. Hughlings Jackson. When admitted he was suffering from left hemiplegia and diabetes, with some twitching of the affected arm, and headache.

He had been accustomed to drink heavily, but had considered himself a healthy man till his present illness, and no history of syphilis was elicited. Two years before admission he was seized with sudden giddiness, and similar attacks continued to recur at intervals. On November 11th, 1885, while at work he had an unusually severe attack, went out and had a glass of beer and walked home, where he fell down unconscious and lost the use of his left side.

On admission he was restless and dull, with considerable rigidity in the paralysed limbs, and no evident loss of sensation. His heart and lungs were sound. His urine amounted to 25 oz. daily, spec. grav. 1040, and containing 4 grains of sugar to the ounce. He had chronic middle ear catarrh enough to account for his deafness. His eyes moved normally, he had opaque striæ on the capsule of both lenses sufficient in the R. to obscure the details of the fundus; the L. fundus was normal, and continued to be so throughout. The opacities continued unchanged till death, and were not characteristic of diabetes.

He was dieted and put upon potass. iodid., gradually increased to gr. xx ter quotidie.

For the first three weeks the left arm and leg lay quite still, and he developed left ptosis. His mental condition was clear. On January 11th the rigidity of the arm began to diminish, and he could move the L. leg slightly. Marked general symptoms of diabetes now set in. The daily amount of urine, however, was only about 30 oz., of spec. grav. 1040 highly acid, and containing 20 grs. of sugar to the ounce, with excess of earthy phosphates. He was given m. i to m. ii of a 1 per cent. solution of nitro-glycerine. The rigidity of the limbs varied much from day to day, and the power in the leg slowly increased; but the urine continued to rise in quantity from 30 oz. to 40, 50, 60, and ultimately 80 oz. daily, diminishing again in March to 50 oz., specific gravity 1040 to 1050, containing about 40 grs. of sugar to the ounce, and about 1·2 per cent. of urea.

During April the left arm remained completely paralysed, moving only slightly during yawning; the leg could be moved *en masse*; the face was slightly unsymmetrical, but there was no obvious paralysis of the left face. His speech was normal, and his memory said to be unimpaired. He was troubled with nausea and vomiting, and his bowels were confined. The sugar, which had remained copious in March, diminished in April, along with a diminution in the quantity of the urine, until on April 16th it disappeared. On April 30th the house physician noted that his abdomen was greatly and uniformly distended and tympanitic, but the vomiting had disappeared. Sensation had markedly diminished on the left side, especially over the arm. The abdominal distension steadily increased, but latterly he seemed free from pain. On May 8th he was found to have died quietly in bed.

His temperature had been slightly subnormal throughout. The treatment was latterly symptomatic, quinine, iron, and carminatives.

The second of these two cases was distinguished from the first by the completeness of the paralysis, and latterly by the extreme abdominal distension, due apparently to paralytic dilatation of the bowel. Other-

wise these two cases presented considerable resemblance, and I must say I was but little prepared for the extensive changes found after death.

Autopsy.—The aortic and mitral valves showed much atheromatous thickening. The lungs were œdematous. The large intestine was greatly distended, but nowhere strictured. Kidneys congested, but otherwise normal. Cerebral arteries much thickened. The whole of the cortex of the right præ-frontal lobe was replaced by yellow syphilitic growth, and the medullary substance underneath and part also of that corresponding to the middle motor area had broken down into a soft brownish yellow material. This softening extended very nearly to the corpus striatum, but this and the remainder of the brain showed to the naked eye no definite pathological change.

In this case the hemiplegia was manifestly due to syphilis, and in Case 5, where there was a clear history of syphilis, we should not be justified in attributing the hemiplegia to the diabetes. In both cases, doubtless, organic syphilitic disease of the cerebrum explained both the diabetes and the hemiplegia. In all cases of nervous lesion occurring during diabetes, it is well to bear in mind the possibility that both these lesions and the diabetes itself may be due to a common cause, a dyscrasia such as syphilis, gout, or rheumatism, or gross intracranial disease. The importance of this point in relation to treatment will be readily perceived. As having an indirect connection with this I may mention a curious fact. Dr. Jackson has recently sent me two specimens of urine to examine for sugar. The one had a spec. grav. of 1018, the other of 1010, but notwithstanding these low specific gravities both urines gave a copious sugar reaction, both with Fehling's solution and with picric acid and potash, and this not on one occasion, but repeatedly, although not always having these specific gravities. Both patients had had syphilitic chancre,

and both, although without syphilitic manifestations, had recently undergone mercurial inunction at Aix.

I have already remarked on the general languor, the disinclination for, and fatigue upon, exertion, which form one of the earliest symptoms of diabetes, and also upon the loss of accommodative power in the eyes, which is but a special manifestation of the general condition. The condition is doubtless chiefly muscular, but, as has been remarked, muscle is only less nervous than nerve, and it is difficult, if not at times impossible, to separate them. Directly associated most probably with the physical cause of this muscular languor is the very frequent absence or marked difficulty in eliciting the knee jerk in diabetes. Such loss or difficulty in eliciting the knee jerk, with good pupillary action and absence of evident gross disease of the spinal cord, would make me examine the urine immediately, as it did in Case 3. It is not by any means always absent, however, or even difficult to elicit, and I do not think this depends either on the severity or the stage of the disease.

Multiple neuritis is not a common result of diabetes, but there can be no doubt that it occurs, and recently I have seen what I believe to be a case of this nature.

Case 7.—Maria H., a married woman, aged 61 years, who had had seven healthy children and had been in good health until nine months before, came to me at the National Hospital, Queen Square, on September 21st, 1888. Her trouble began about Christmas, 1887 with a numbness of the right forefinger, which gradually extended to the other fingers of the same hand, and very soon to the right leg, with loss of power of dorsiflexion. In January, 1888, she rather suddenly lost the use of the left leg, and she became unable to walk without assistance, her knees giving way under her, especially on going upstairs.

She had "rheumatism" in the left arm two years ago and could not use it for several months. She had never had gout, and had had no deep-seated pain such as occurs in

alcoholic neuritis. She noticed frequency of micturition only about three months before. Latterly her legs were somewhat swollen.

Sensation, especially that for touch, was much blunted over all the limbs especially at their extremities. The knee jerks could not be elicited, and the plantar reflex was slight. There was no absolute paralysis of muscles, but all were feeble, especially those of the lower limbs. The electrical reactions of the muscles were normal in character, but that to faradism was diminished.

Her heart and lungs were sound, and her discs and fundi also normal, but she had commencing peripheral striæ in the right lens. She was passing about two pints of urine daily, it had been much more copious—spec. grav. 1035, and containing no albumen, but about 35 grains of sugar to the ounce.

I have not been able further to watch this case.

Much more frequent than general peripheral neuritis in diabetes is the occurrence of local neuralgia, for example sciatic neuralgia and occipital pain such as occurred in Case 4. Trigeminal, especially infra-orbital, neuralgia is also common. It is significant that these are forms of neuralgia also common in gout, and it is interesting to know, on the other hand that severe experimental irritation of a peripheral nerve, *e.g.*, the central end of the vagus, or the sciatic is sufficient to induce diabetes, acting apparently reflexly through vaso-motor disturbance.

I have indicated that it is well to be cautious in attributing to diabetes nervous lesions possibly due to other causes, but it is certain that not only sensory, but also motor paralyses, both temporary and persistent, do occur as a result of diabetes. I consider that the oculo-motor lesion presented by Case 3 is an instance in point. The lesion occurred suddenly, and was evidently vascular rupture or blockage of a minute vessel, near the middle of the left oculo-motor nucleus, where the cells representing the weakened internal and superior

rectus muscles are in close proximity. It is interesting to note that accommodation was lost in both eyes to an equal and a very considerable degree, the loss evidently depending on the constitutional condition, not on the local lesion. Of course, it would be impossible to disprove that this lesion might have been due to either gouty or syphilitic disease of vessels. All that can be asserted is that there was otherwise no proof of the existence of such disease. A similar statement might be made regarding the following case, in which there was apparently a vascular lesion in the optic radiations of the left occipital lobe, somewhat damaging neighbouring sensory fibres.

Case 8.—Donald Mc D., tailor and publican, æt. 54 years, was admitted into the London Hospital on Feb. 11th, 1886, under the care of Dr. Hughlings Jackson. He complained of loss of sight, memory and weight, with stiffness of the hands and numbness, with "pins and needles" on the palmar surface of the fingers, especially of the right hand. Also he stated that he had "temporarily lost his reason" in the previous September.

His father had died of cancer of the face at 60, his mother of dropsy also about 60, an uncle and a sister had died insane. He had been a tailor for 30 years, then a publican for six years. Latterly he had been extremely intemperate, especially since the death of his wife three years before. There was no history of gout or syphilis, but there was some scarring over the tibiæ.

In August 1885 after a heavy drinking bout, he complained suddenly of something having fallen over his eyes. He had no giddiness or paralysis, but he felt strange. One evening in October, 1885, without loss of consciousness, his mouth was drawn over to the left side, and the "left" (? right) side of his face was said to be numb. The deformity passed off the same evening.

When admitted he was in fairly good general health, although his weight was said to have fallen from 17½ stone to 12 stone 9lbs. during the preceding six months. His

internal organs showed no organic disease. His urine was 1039 acid, no albumen, 6 per cent. of sugar. His memory and mental powers were degenerated, but there was no loss of gross sensory or motor power. His ocular movements were normal, the pupils sluggish, the fundi normal, but the right halves of both visual fields were lost. On February 14th his fields were:—

	55°	40°		40°	45°
L	55°	+	5°	R	45°
	45°	25°		40°	15°

He was dieted and put upon quinine, and he improved considerably in most respects. His urine was never much above the average quantity, it fell in spec. grav. from 1038 to 1030, and the amount of sugar fell from 7 per cent. to less than 2 per cent., the urea at the same time falling from 3 per cent. to 2½ per cent.

He left the hospital on April 9th, the right lateral hemianopsia persisting, and the fields having apparently diminished. Qualitative colour-vision was normal.

I shall not here refer to diabetic coma, except to mention a fact of importance to the ophthalmic surgeon, viz., that amblyopia occurring suddenly in a case of diabetes without obvious ophthalmoscopic explanation most probably presages the near onset of coma, having in this relation very much the same significance as the amblyopia of uræmia. He should also bear in mind that it usually occurs soon after the commencement of the disease, and not unfrequently soon after the commencement of rigid diabetic treatment.

(To be continued.)

SCHAPRINGER (NEW YORK). A case of Metastatic Carcinoma of the Choroid.—*Amer. Journal of Ophthal.*, Oct., 1888.

The great rarity of cases in which metastasis of malignant tumour (carcinomatous or sarcomatous) to the eyeball from other organs has been shown to occur adds considerably to the interest of the case now reported by Schapringer. He refers to all the records of such cases, six in number, which he had been able to find, and these may be briefly referred to here. Perls, in 1872,* reported the case of a labourer, æt. 43, who suffered from pleurisy and indefinite lung symptoms. "The autopsy revealed primary carcinoma of the lungs and pleura, with metastases in both choroids as well as different other organs." From microscopic examination Perls concluded that the metastasis was due to capillary embolism. The second case, described by Hirschberg,† occurred in a woman who had suffered for nine years from a tumour of the right breast. No post-mortem examination could be obtained.

Schoeler‡ published a similar case soon afterwards. A woman, æt. 33, had six months previously undergone an operation for cancer of the left breast.

After death microscopical examination by Uhthoff confirmed the diagnosis of carcinoma of the choroid. The fourth case, described by Hirschberg and Birnbacher,|| was that of a woman, æt. 28, who lost the sight of the left eye shortly after the removal of her right breast for cancer. After death the diagnosis of carcinoma of the choroid was verified by the microscope.

Pflüger¶ has recorded a case of metastatic sarcoma of choroid from a tumour in the neck, making the fifth case,

* Virchow's Archives, Bd. lvi., p. 437.

† Centralbl. f. prakt. Augenheilk., 1882, p. 376.

‡ Berliner Klin., Wochenschr., 1883, pp. 105 and 666. Centralbl. f. prakt. Augenheilk., 1883, p. 236.

|| Arch. f. Ophthal xxx., 4, p. 113.

¶ Arch. f. Augenheilk., xiv., 1.

and the sixth, that of Manz, is referred to by Vossius in his recent work, "Grundriss der Augenheilkunde," but no particulars are given.

Schapringer's case, which is reported in detail, is briefly as follows :—

The patient, a married woman, æt. 51, had her right breast and axillary glands removed for scirrhus in October, 1885. Microscopical examination proved the correctness of the diagnosis. The wound healed by first intention; there was no local recurrence.

Early in August, 1887, she discovered accidentally that her left eye was nearly blind. In October she was sent to Schapringer. The left eye externally presented no abnormality beyond some dilation of the pupil and its want of reaction to light. The central part of the field of vision and the upper peripheral part were entirely abolished. In the lower, outer and inner part of the periphery some sight was retained. On ophthalmoscopic examination the media were found to be clear. There was slight prominence of the optic papilla, but its outlines were well defined. There was no marked bending of the vessels near the disc as in ordinary papillitis, but they showed parallactic movement on the surface of the disc. In the yellow spot region, and its temporal vicinity, over an area about four times the size of the O.D., the reflex was of reddish-white colour, and lighter than that of the rest of the fundus. The refraction of this discoloured area was H3.5D, while that of the surface of the disc was H1.0D, and of the normal portions of the fundus Em. A few thin blood-vessels ran over the reddish-white area, but no connection could be traced between them and the regular retinal vessels. The retina in the lower part was detached, but not much folded, and still fairly transparent.

The right eye was in all respects normal. When the left eye was again examined, eighteen days later, the refraction of the y.s. region was H4.5D. The detachment at the lower part had increased in extent. There was no alteration in the tension of the eye throughout. The patient died on December 27th. At the autopsy numerous cancer nodules were found in both lungs and in the liver. The

left eyeball was removed and carefully examined, and a drawing is given of the naked eye and microscopical appearances. An extensive but shallow detachment of retina was found in the lower and outer parts. Except in the region of the macula, the several layers of the retina were easily distinguished, but at this part there was considerable small-celled infiltration of this tunic. The choroid on the temporal side of the O.D. was much thickened, and entirely transformed into carcinomatous tissue. The new growth was thickest at that part corresponding to the macula, and gradually thinned down peripherally. The cancer cell nests in the choroid were numerous and characteristic. The hexagonal pigment layer covered the growth on its inner surface, except over the thickest part, where it was detached and thickened by some newly-formed connective tissue. The new growth in the choroid was composed of "a firm groundwork of fibrillar connective tissue containing numerous nests, replete with large epithelial cells." Besides these cells many nests contained accumulations of red blood corpuscles. The microscopic appearances were strikingly like those of scirrhus of the mammary gland. J. B. L.

G. C. SAVAGE (Nashville, Tenn.) Binocular Astigmatism, as influenced by the Harmonious Non-Symmetrical Action of the Oblique Muscles.—*American Journal of Ophthal.* Sept., 1888.

The phenomena of so-called Binocular Astigmatism, as described by Culbertson at the meeting of the American Medical Association in May, 1888, are attributed by Savage to a rotation of the eyeballs by the "harmonious non-symmetrical action of the oblique muscles," which he discovered, and described in the journal of the above Association, Nov., 1887. The phenomena are imperfect vision, proximal and remote, distortion of rectangles and apparent inclination of level surfaces, all caused by the use in binocular vision of cylindrical glasses that had been carefully adjusted in monocular examination. Culbertson finds

that changing the axis of one or of both glasses removes the above distortion.

Savage asserts that but three explanations of these phenomena are possible: (1) Culbertson's theory of rotation of eyeballs by the recti muscles; (2) Martin's, of sectional contraction of the ciliary muscles; and (3) the correct one, his own. Culbertson's theory seems to be as follows:—Some want of balance in the various muscular forces at work causes an eye to rotate on its antero-posterior axis, so that the normal parallelism of the vertical corneal meridians is interfered with. Hence the distortion phenomena as described, which Culbertson cures by rotating the cylindrical glass. Savage maintains that under such conditions diplopia would naturally result, and the rotation of the cylindrical glass could not remove the defect. Sectional contraction of the ciliary muscle cannot cause the phenomena of "binocular astigmatism," as they exist during paralysis of that muscle by atropine, and are not such as would be produced by the action in question.

Savage explains his harmonious non-symmetrical action of the obliques as follows:—The obliq. sup. of one eye acts with the obliq. infer. of the other eye to rotate the eyeballs, so as to keep the naturally vertical meridians of the corneæ always parallel, thus preventing diplopia. For instance, if the obliq. sup. dext. rolls the vertical meridian of its eye 15° to one side, the obliq. infer. sinist. does the same for the vertical corneal meridian of the other eye, keeping these meridians still parallel though slanting. This function, he believes, is exercised in most astigmatic eyes before corrected by lenses, when the best meridian of one or both eyes lies somewhere between the horizontal and vertical meridians. The object is to make the emmetropic meridian approach the vertical if nearer to it, or the horizontal if nearer to it, so as to make vision sharper. This habit of rotation is formed early, and continues through life unless correcting lenses are worn. At first, even with the glasses, the old habit continues, and produces the phenomena of so-called binocular astigmatism—*e.g.*, the floor appears slanting and rectangles distorted, etc.

Anyone can produce the phenomena for himself by

inserting convex cylinders in a trial frame and placing correcting concave cylinders in the same frame. When the axes of the respective concave and convex cylinders coincide all objects are seen perfectly; but when these axes do not coincide the floor appears slanting and rectangles distorted. Savage then considers that the singular distortions observed by astigmatic eyes with correcting lenses are due to the axis of the glass not coinciding with the proper corneal meridian, owing to a rotation of the eyeball produced by the above-described harmonious non-symmetrical action of the obliques. In his experiments on himself he found that when he observed the floor slanting from left to right, and the right end of rectangles narrowed, he could make the floor appear nearly level, though the rectangles remained distorted, by making the axes of the cylinders before his right eye coincide; while by making the axes of the cylinders before his left eye only coincide, the floor appeared level and the ends of the rectangle equally wide.

The correct practice Savage considers to be to give the full correcting cylinder and place its axis to coincide with the best meridian in its natural position, as determined by monocular examination with paralysed accommodation. If "binocular astigmatism" appear and does not pass off shortly, direct the patient to abstain from near work for a few days, and in rebellious cases suspend all accommodation for a time by the use of atropine.

The paper is interesting, as most oculists must have observed in the persons of their patients the phenomena described as "binocular astigmatism," and the experiments of Savage with cylindrical lenses are easily repeated, but it seems hardly proved that the phenomena are actually due to the cause he alleges. First, there is no demonstration of the actual existence of the rotation he assumes; it is only inferred from its supposed effects. Secondly, there is no greater inducement for an eye to make it in binocular than in monocular vision. Thirdly, if this rotation were the cause of the phenomena observed by persons wearing correcting cylinders for the first time, it must have the effect of blurring both distant and near vision—an argument which Savage considers conclusive against the

- theory of sectional contraction of the ciliary muscles. If the supposed rotation only occurs in near vision or in distant, so may the sectional contraction of the ciliary muscles. Anyone can convince himself that vision is blurred so soon as rectangles become distorted by repeating Savage's experiments with cylindrical lenses in a trial frame ; and the distortion of rectangles and obliquity of the floor are as easily produced by looking obliquely through a cylindrical glass as by any rotation of its axis as in his experiments.

J. B. S.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, JANUARY, 31ST, 1889.

J. W. HULKE, F.R.S., President, in the Chair.

Exceptional Forms of Choroiditis.—Mr. Jonathan Hutchinson commenced his communication on this subject by remarking that the recognition of the peculiar and very striking forms of atrophy which follow on choroiditis was among the earliest achievements of the ophthalmoscope. Nor was it long afterwards that the scattered form called "disseminate" was associated with syphilis. As soon as we obtained the means of recognising the subjects of inherited syphilis during childhood and adolescence, it was observed that certain somewhat peculiar forms of choroiditis and choroido-retinitis were present in young persons who had notched teeth, had suffered from interstitial keratitis, and some of whom were deaf. Next in course of time came the observation that in high degrees of myopia, in addition to the crescentic patches of denudation, which are formed at the side of the disc, the choroid is liable to atrophy at the yellow spot, and, in exceptional cases, irregularly at other parts of the fundus. Whether it could be said that any process of inflammation preceded the atrophy in these cases of scattered changes in connection with elongation of the eyeball might be matter of doubt. Still later, a peculiar form of choroiditis was observed as occurring near to the disc and yellow spot in middle-aged or elderly persons, in which the changes consisted of very minute spots, which, as time went on, might coalesce and form

patches. The first observations respecting this disease were made by Mr. Waren Tay, and published by Mr. Hutchinson. If to the forms of choroiditis above mentioned we add the secondary changes which have been recognised as following on injuries, certain others in which recurring hæmorrhages occur, and the rare instances in which tubercle has been observed, it was believed that the present state of our clinical knowledge in reference to choroiditis would be fairly stated. At any rate, choroiditis had not been associated with any precision with other causes than those adverted to. Probably, however, all ophthalmic surgeons have recognised that there are examples of choroiditis met with in practice which it is difficult to assign to any one of the above groups, more especially that there are cases in which the conditions common in choroiditis disseminata are closely simulated, and yet the history of syphilis, whether acquired or inherited, is wholly wanting. These latter cases are, it was suggested, of importance in a double sense, that is, both as regards their treatment and because it has been thought by some that choroiditis disseminata is in itself almost a pathognomonic symptom of syphilis, and it has been used, as notched teeth and keratitis are, as an important and almost conclusive aid to diagnosis. No attempt, as far as the author was aware, had been made to connect choroiditis with any other diathesis than that resulting from syphilis. Although we know that arthritic iritis is very common, no one has ever diagnosed choroiditis in such association; nor has it been asserted that struma, which is seen to be the parent of certain skin diseases, notably of lupus, ever stands in a similar relation to disease of the choroid. Especially it is to be noted that no form of choroiditis (always excepting the syphilitic) has been found to occur in association with inflammatory affections of the pia mater of the brain, such for instance, as those which produce the adhesions that constitute the chief lesion in general paralysis of the insane. In all brain diseases we look carefully at the optic disc, but we do not expect to get any help in our diagnosis from morbid conditions in the choroid.

Mr. Hutchinson next stated that he proposed on the present occasion to keep the subject within bounds by

leaving wholly aside the common forms of the disease, such for instance, as the syphilitic varieties, those resulting from injuries, and those complicating myopia. He purposed to deal only with certain exceptional forms. It might be convenient, however, before proceeding, to offer the following list of the principal clinical groups of choroiditis, appending to each name of group a few brief words as to peculiar features and grounds of diagnosis. (1) The choroiditis of myopia : usually central around the disc or at yellow spot, but sometimes occurring in scattered patches. The chief element in the diagnosis is the presence or otherwise of myopia in a high degree. (2) Choroiditis senilis centralis : Tay's choroiditis, always central and never causing denudation of large areas, met with only in those past middle age, but occasionally simulated in syphilis. (3) Choroiditis as a family disease : various in form, often beginning in childhood, but sometimes not till middle life. Several members of the same family affected and the changes usually aggressive. Tay's choroiditis may sometimes occur as a family malady. (4) Choroiditis in early periods of syphilis : analogous to the exanthem eruptions of secondary syphilis, always in scattered patches and usually symmetrical, may be completely cured by treatment. (5) Choroiditis in late periods of syphilis : analogous to the tertiary or lupoid eruptions on the skin, always serpiginous and aggressive, often not symmetrical ; benefited by treatment, but often not cured. (6) Choroiditis of inherited syphilis : either of the two preceding forms may occur in inherited syphilis ; the periphery of the fundus is often alone affected. (7) Choroido-retinitis simulating retinitis pigmentosa : this group includes cases the result of blows, and many of those due to inherited syphilis. Almost always aggressive, usually attended by changes in the disc. (8) Choroiditis without obvious cause, usually, but not always, occurring in young adolescents, and, with an interval symmetrical, changes often serpiginous as in tertiary syphilis ("lupus of choroid") but sometimes disseminate. Not distinguishable from syphilitic cases, but by the absence of specific history (9) Hæmorrhagic choroiditis : very rare, seen in growing adolescents and in connection with sexual disturbances. Liability

to repeated hæmorrhage into the choroid. Analogous to the cases of recurring vitreous hæmorrhage, and sometimes associated with them. (10) Choroiditis with iritis and cyclitis : characterised by extending with definite recurrences through the whole life. Associated with chilblains. (11) Choroiditis following blows in the eye : this was to be distinguished by scars caused by lacerations. It was a progressive form of choroido-retinal disorganisation, always limited to one eye. (12) Choroiditis consequent on the deposit of tubercle : no proof had as yet been afforded that tubercular disease of the choroid was aggressive. It might, however, easily be the fact that what he had termed lupus of the choroid was associated with tubercle.

Under the head of choroiditis as a family disease, Mr. Hutchinson mentioned five series of cases from his own experience, and said that the number might easily be extended. In the first, many children suffered, and the failure of sight was attended by failure of intellect and paraplegia. In the males there was remarkable growth of the mammary glands. In another series, two sisters suffered alike, and there was a history of proclivity to insanity. In another, three brothers were affected, and none until middle life, there being no other ailments whatever.

These family forms were, it was suggested, to be compared with Kaposi's disease, retinitis pigmentosa, and other maladies which go to prove that under some law of inheritance, the children born to certain couples may possess by structural idiosyncrasy a weakness of certain tissues and organs which renders them liable to disease at a certain age. Two cases of hæmorrhagic choroiditis were narrated, both the patients being young men. A comparison was drawn between these very rare cases and the somewhat more frequent ones in which recurrent hæmorrhages take place into the vitreous body. Examples of the latter had been brought before the Society by Mr. Eales, of Birmingham, and himself some years ago, and all their cases had occurred in young men. This limitation of the malady to one sex and one period of life had been confirmed by other observers. Mr. Hutchinson said he did not know of any case records of hæmorrhagic choroiditis, but Mr. Nettleship had, in a reference to it, spoken

of it as a disease of young men. On the other hand, Mr. Power had recorded a very remarkable example of acute hæmorrhagic choroido-retinitis in a young girl. It was a peculiar case, and was supposed to be due to amenorrhœa, thus confirming the supposition that variations of vascular tone in connection with the sexual system were the usual cause. The next case described was an important one, in which the notes extended over nearly twenty years. The patient, a married man, in whom there was no history of syphilis, had suffered from most extensive choroiditis in both eyes. The progress of the disease had been marked by very distinct recurrences at intervals of a few years, attended by pain and increase of failure of sight. One pupil was almost closed by adhesions, and in both some tendency to cyclo-iritis had been noticed. It was suggested that this case was really of the same nature as the examples of relapsing cyclitis so well known in association with chilblain proclivity, and sometimes with inheritance of gout. A group of three remarkable cases was next referred to, in which young women apparently in good health had become the subjects of aggressive choroiditis in both eyes without obvious cause. In all, the suspicion of inherited syphilis seemed quite excluded by the family history; but in one in whom periostitis of the tibia was present, it was possible that syphilis had been conveyed in vaccination. Mr. Hutchinson said that, so far as the objective phenomena were concerned, he knew of no means of distinguishing these cases from the common syphilitic type. The absence of history and of concomitant symptoms were the only diagnostic guides. All were of the serpiginous form (*lupus of choroid*), and in two, although the patients looked strong, strumous disease of lymphatic glands had occurred. With the cases last mentioned were given three others, of which men were the subjects, and in which the disease began later in life, the peculiarity again being the entire absence of probability as to syphilis. As in the preceding, the common conditions of syphilis were exactly simulated. In concluding his paper, Mr. Hutchinson said that he sought diligently, but quite without success, for any guiding symptoms by which to distinguish the cases of choroiditis which were not syphilitic from those which were

so. He had presented, in illustration of what he said, a great number of very good drawings, and he was quite sure that if he were to place them all side by side on the table, no one would be able by reference to the appearances presented to pick out the non-syphilitic ones. Under these circumstances it still remained to some extent an open question whether, even in the exceptional cases in which the evidence against syphilis seemed the strongest, we ought yet to suspect its presence. There were obscure ways in which specific contamination was sometimes effected without the patient's knowledge; and, as regards inheritance, it must be admitted that it was not always possible to find its proof. All must be familiar with cases in which for long the diagnosis of syphilis had been abandoned, until unexpectedly some chance collateral fact came to light and revealed it. He also adverted to the extreme difficulty of recognising signs of activity in the processes of choroiditis, and of distinguishing cases which were still aggressive from those which had come to an end. He related some very remarkable instances of improvement from treatment by mercury and iodides, under conditions which had at first been thought hopeless. Almost the only symptom which he knew of as implying aggressiveness was the existence of a narrow line of yellowish white around the patches, and it was by no means always present. His facts justified him, he said, in urging that whatever the stage and whatever the diagnosis, whether syphilitic or otherwise, mercury ought to have a prolonged trial in all cases of choroiditis. It was very remarkable what excellent sight might be regained, in spite of the most extensive destruction of the membrane.

The President had met with cases of choroiditis in which no evidence of syphilis was obtainable, but which, so far as the ophthalmoscopic picture was concerned, could not be distinguished from those of syphilitic origin. He agreed with Mr. Hutchinson as to the value of mercury and iodide of potassium, even in a very late stage of choroiditis.

Dr. Mules was able to add to Mr. Hutchinson's list one more case of hæmorrhagic choroiditis. The patient was a young lady, aged 19, under the care of his father. Choroidal hæmorrhage occurred at intervals of four to six weeks,

during which time menstruation was suppressed. About three or four months after the fourth recurrence of the hæmorrhage she died of apoplexy.

Dr. Argyll-Robertson had seen numerous cases of choroiditis in which there was no specific taint. He thought that the area of the fundus chiefly affected might aid in diagnosis, the syphilitic variety affecting chiefly and by preference the periphery, whereas in the other varieties the stress of the disease fell upon the central part. In the syphilitic form also both eyes were generally affected nearly equally, and the patches were more or less symmetrically arranged in the two eyes; this was not so generally the case in the non-specific varieties.

Mr. Waren Tay asked whether some exceptional cases of myopic choroiditis might not closely simulate the syphilitic form, and referred to one case, a lady, in whom no evidence of syphilis could be obtained, but whose choroids exhibited changes extremely like those caused by syphilis; her refraction was myopic.

Mr. Hutchinson, in reply, said he well remembered the case referred to by Mr. Tay, and fully agreed with him that myopia might induce changes very like those of syphilis. That fallacy was, however, excluded in the cases which he had cited by the fact that no myopia was present in any one of them. He could not agree with Dr. Argyll-Robertson that syphilitic choroiditis might be distinguished by its being usually peripheral. That due to inherited taint was often so, but that from acquired disease was often—indeed, usually—central. Although he had adduced evidence in support of that belief, he must confess that he did not feel quite so certain as Dr. Argyll-Robertson and the President appeared to do that there were cases which resembled syphilis and yet were not so. He thought that all such exceptional cases should be carefully recorded and the facts sifted, not only with the hope of deciding the syphilitic question, but of discovering other antecedents which might possibly be the cause of the disease.

Primary Retinal Phlebitis.—Dr. Mules (Manchester) exhibited ophthalmoscopic drawings and read notes of three cases of primary retinal phlebitis. In two of these, clots in

the veins were clearly seen with the ophthalmoscope. In the first and second case the retinal changes cleared, leaving the patients without ophthalmoscopic evidence of any visual disability; the fields of vision showed only well-marked central scotomata. The third case, occurring in a man aged 80, was of exceptional interest, for in addition to the phlebitis there was an exudative choroiditis of a gouty character, the first instance in which such a condition has been substantiated. The author expressed a hope that more of these cases will be recorded, and a careful study made of the disease of the intra-ocular veins, concerning which our knowledge was as yet very scanty.

Mr. Hutchinson was greatly interested in Dr. Mules's account of his cases. Some years ago he had had several cases under his own care in which he thought retinal venous thrombosis had occurred, and in one of these the thrombus had shifted its position in the vein during the time the patient was under care.

Card Specimens.—The following patients and card specimens were shown :—

Mr. Lang : 1. Traumatic Enophthalmos with Retention of Perfect Acuity of Vision. 2. Fungous Growth in the Cornea. 3. Ophthalmoplegia Externa, with Retinal Changes.

Mr. Gunn : Peculiar Congenital Malformation of Eye-ball, affecting Iris, Lens, Vitreous and fundus oculi.

Mr. Adams Frost : 1. Case of Gummata on the Iris. 2. Case of Retinitis Pigmentosa with Peculiar Visual Field.

Mr. Priestley Smith : Sheet of Rules for School Children and Teachers.

Mr. J. R. Lunn : Coloboma of Iris, Secondary Cataract ; Coloboma of Choroid and (?) of Optic Nerve Sheath.

Mr. Doyne : Unusual Form of Degeneration of Lens.

Mr. Stanford Morton : Two cases of Blocking of Retinal Vessels associated with Albuminuria.

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SOME OCULAR AND NERVOUS AFFECTIONS IN DIABETES AND ALLIED CONDITIONS.

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(Continued from p. 80, Mar., 1889.)

On the subject of phosphatic urine a positively huge amount of observations, chemical and clinical, has accumulated during recent years, but the net result of these observations has been very small indeed. We are almost wholly in the dark as to both the meaning and the treatment of phosphaturia. As was remarked, however, regarding diabetes in the beginning of this paper, we are certain that this symptom appears in many different pathological conditions, and is of very various import in different cases. I venture also to say that my experience leads me to agree with those who believe that the symptoms, diabetes and phosphaturia, are intimately related.

In any discussion of the subject it is to be remembered that phosphates are present in the urine in two forms, viz., acid and earthy phosphates. The acid phosphates, consisting of phosphoric acid in combination with sodium and potassium, with excess of acid, are extremely soluble, and are therefore not met with as urinary deposits. They account, according to Roberts, for about two-thirds of the phosphoric acid excreted by the kidneys, and along with other acid salts and free acids give rise to the acid reaction of normal urine. The

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earthy phosphates, consisting of phosphoric acid in combination with calcium and magnesium, are soluble in acid, insoluble in alkaline solutions, and therefore appear as urinary deposits in alkaline, or feebly acid urines, or when they are excreted in excess. It will be seen, therefore, that, except by precipitation and analysis, we have no means of telling even approximately the amount of phosphates excreted daily. In consequence, however, of the variation in the excretion of phosphates during the day, and from day to day, under the influence chiefly of diet and digestion, even such an analysis gives no reliable data for generalisation unless the whole daily urine is examined, and unless also the observation is protracted over a considerable period. And even then there is a fallacy, for, as pointed out by Salkowski, phosphates are excreted in the fæces. That this intestinal excretion of phosphates may be very considerable, I realised not long since in the case of a nervous middle-aged lady sent to consult me by her medical man. One of her troubles was the fact that she frequently passed large quantities of "sand" in her motions, and of this "sand" she brought me a small bottleful. It was a greyish yellow crystalline material, exactly resembling an unusual deposit in the urine of a hospital patient which I was once asked to examine by a puzzled clinical clerk, and which proved to be good ordinary sea-sand. The "sand" brought by my patient, however, I found on examination to consist of large crystals of ammonio-magnesian phosphate. The case had affinities with those I shall mention subsequently, but I refer to it as having impressed on me strongly the above physiological fact. In the cases of phosphaturia observed by me prolonged and detailed analysis was impossible, and I could deal only with the earthy phosphates.

The phosphates of calcium and magnesium occur in the urine in two forms, amorphous and crystalline (stellar), the two probably not differing in their clinical

import although the latter have been supposed more serious. I only refer in passing to the deposit of phosphates (ammonio-magnesian prisms) which occurs, in the alkaline urine of ammoniacal decomposition from cystitis, pyelitis, and renal suppuration, whether due to surgical causes, to vesical or renal calculus, or to disease of the spinal cord. They do not fall within the scope of my paper. I may, however, refer to a mechanical property of the stellar phosphates, as setting in action an important nervous reflex. The needles and stars of this form of phosphates are extremely sharp, and are, therefore, liable to set up considerable irritation of the vulva and urethra similar to that induced by an acid urine with abundant uric acid crystals, a condition which may alternate with the phosphaturia. Some five or six years ago, I remember being consulted by a young man, in good general health, but much distressed because he had, without any cause so far as he knew, begun to have rather frequent seminal emissions. There was no evident disease of the genito-urinary organs, or of the rectum, and I believed him to be, as he said, guiltless of any habit that would explain the trouble. On examining his urine I found it neutral in reaction, and containing a deposit of stellar phosphates, numerous stars, and sharp needles. I prescribed him phosphoric acid and strychnia, with a fairly nitrogenous diet, and within a day or two the emissions ceased, and he had no further trouble. The needles irritating the neck of the bladder and urethra were, I think, enough to explain the trouble.

Case 9.—Ernest C., aged nine years, was sent to the National Hospital, Queen Square, on September 11th, 1888, by Dr. Geo. B. Batten, of Dulwich, and came under my care in the Out Patient Department. Dr. Batten forwarded with the patient a letter detailing his symptoms, and he has since then kept the patient closely under observation, sending him to me from time to time with full reports as to his symptoms and the condition of his urine in the interval,

thus adding largely to the value and interest of the case. Dr. Batten had seen the boy only once, and the symptoms on account of which he sent him to Queen Square were as follows:—"Vomiting continually, headache, especially in both temples, and great apathy, slight twitchings of the muscles of the nose and eyelids, with occasional drawing of the head sharply to the left and grasping of the left thumb." He mentioned also that he had a coloboma of the R. choroid, a rudimentary R. testicle, slight lung affection, and urine, 1028 acid, no albumen, no sugar, but depositing mucus and stellar phosphates.

I found the patient a thin, pale, rather anxious and downcast little fellow, whose nose, eyelids, and R. thumb twitched irregularly and almost continuously in a way somewhat resembling the movements of chorea, but with a difference difficult to express but readily enough appreciated on seeing the movements. These symptoms, with vomiting, headache, and apathy, were said by the mother to have begun three weeks before, and she mentioned also that he slept badly, often starting up during the night. His urine was 1023, slightly acid, with a copious deposit of phosphates in it, and no albumen. His heart was sound, his lungs showed slight general bronchial catarrh. He fixed badly with the R. eye, which showed a large central coloboma of the choroid with a deformed disc, the details of which I shall describe subsequently. L. eye normal.

With the exception of the symptoms detailed above, there was no evidence of affection of the nervous system. Gait, motor power, and knee jerks were normal. Sensation also perfectly normal so far as rough general tests indicated. The boy had apparently been perfectly well three years before, when he was said to have had a heat-stroke, the precise details of which I could not ascertain; but apparently he had had severe headache, and had been very ill for several weeks, but ultimately recovered, and was practically well, although rather delicate till the present attack. He had never had acute rheumatism, but his father had an attack at the age of 16, and has some heart affection, on account of which he has been rejected for several clubs. His mother is a very healthy-looking and very intelligent woman, who

has had no serious illness. An elder sister had acute rheumatism at seven years. An infant brother at eleven months is the picture of health. The mother has had two miscarriages, but there is no evidence of syphilis.

I wrote Dr. Batten that I believed it to be a case of phosphaturia, associated with an inherited rheumatic diathesis; not a case of organic cerebral disease, as he had feared. On account of this rheumatic tendency, and as a renal sedative, I advised Potass Bicarb. with Tinct. Hyoscyam. in Inf. Buchu with gr. $\frac{1}{4}$ of Grey Powder twice daily as an alterative for a fortnight, with a non-nitrogenous diet.

A fortnight later he was reported much better, had slept soundly, and was perfectly cheerful and well. He still, however, looked pale, and had some twitching of the L. face. His morning urine was now 1030, decidedly acid, no deposit, giving no reaction of albumen or sugar, but depositing phosphates on boiling. The treatment was continued. At this and on subsequent occasions I made a careful examination of his eyes. As I have said, he did not fix well with his R. eye, but the ocular and palpebral movements were normal. The irides also were normal, the R. pupil a shade larger than the L., and not reacting so promptly to light, both acting well with accommodation. V. R. not $\frac{1}{200}$, and with difficulty J. 14; L. $\frac{1}{2}$ and J. 1 easily.

Ophth.—R. : A very large oval patch of absence of choroid (Fig. 1.), three or four times the disc-diameter in its horizontal axis, occupying the centre of the fundus, including the Y. S. and extending well to the temporal side of it. The edge of the patch sharply defined, pigmented at the nasal and temporal margins, not above or below. The surrounding choroid undisturbed. Several retinal vessels, in skirting the patch, trespass slightly on it above and below. The general surface of the patch dead-white in colour, depressed towards the outer part, where it is best seen with a concave lens, and at this point a vessel, apparently piercing the sclerotic, runs across the patch into the choroid above and below. The disc is deformed, ill-defined at its outer margin, and with a narrow, deep, and very oblique physiological cup. Left fundus and remainder of right fundus normal. Slight hypermetropia.

The appearances, pretty evidently congenital, reminded me of the left fundus (Fig. 2) of a boy (Edward B., aged 15 years) suffering from rheumatic endocarditis in the London Hospital. Notwithstanding that in that case the patch was on the nasal side of the disc, and was occupied in the centre by dense brown pigment, the resemblance is considerable, and I reproduce the drawing made at the time partly because of that, and partly because the condition is a rare one. His right fundus presented also an unusual pigmentation re-

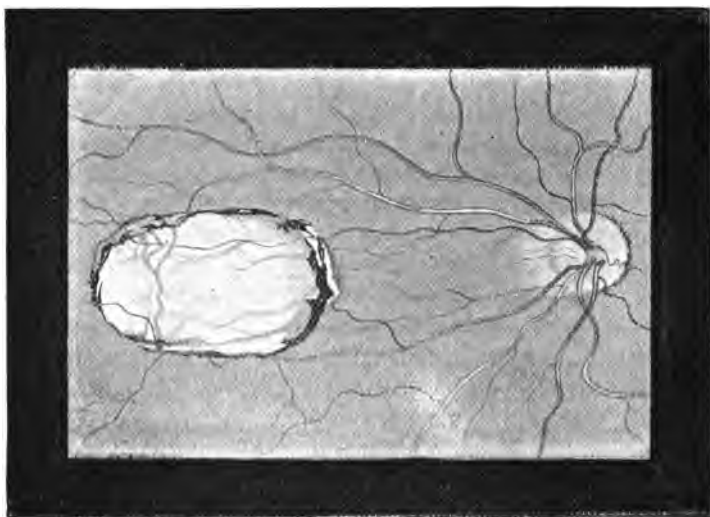


FIG. 1.

R. FUNDUS OF ERNEST C. ERECT IMAGE.

sembling that figured by Jæger in his Atlas in Fig. 76, and which I have seen also in a case of "functional albuminuria."

I ascertained subsequently that the boy Ernest C. had been seen by Mr. Nettleship at Moorfields Eye Hospital in January, 1888, and his out-patient letter, which Mr. Nettleship kindly sent me, shows a note regarding the fundi agreeing almost exactly with the above, and also the following:—"Since measles last summer (*i.e.*, 1887) 'continually snapping his eyes,' and wants to go to bed as soon

as it is dark, seems dull and manner 'silly'—much the same condition, it will be seen, as when he came to me.

On November 15th, two months after I first saw him, Dr. Batten sent him to me looking very well, bright, intelligent, and cheerful, the headache and vomiting quite gone, but with still slight twitching and bronchial catarrh. The urine in the interval had varied, always of high specific gravity, and showing once a deposit of urates, once a deposit

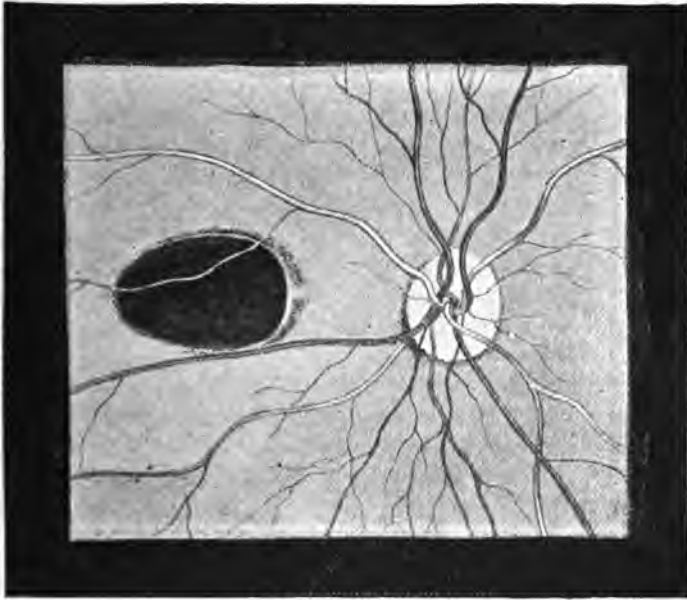


FIG. 2.

L. FUNDUS OF EDWARD B. ERECT IMAGE.

of phosphates on heating, but in general quite normal, no albumen, no sugar. The urine of that morning before breakfast was 1030, acid, clear, no excess of phosphates, no albumen, and at first, on boiling with Fehling's solution, no yellow oxide, but throwing down in two minutes while cooling a copious yellow deposit. The after-breakfast urine gave no such reaction, but was thick with urates. Practically

reversing my former treatment, I now prescribed him phosphoric acid and ipecacuanha, with a meat diet and abstinence from starch and sugar. On November 25th Dr. Batten reported that, under this treatment, the urine had become highly acid, 1030 to 1040 specific gravity, average or rather scanty in amount, and showing uniformly a copious deposit of uric acid crystals, which caused urethral irritation, once also an excess of phosphates on heating, and once a definite yellow deposit with Fehling's solution, on other occasions only a slight greyish precipitate. The acid mixture was now left off, but the meat diet continued, with the result that the uric acid deposit gradually disappeared, the phosphates again deposited spontaneously, although the urine remained acid, and there was now a distinct yellow reaction with Fehling's solution. At this time, all other treatment being suspended, Dr. Batten treated him for threadworms with Santonin and quassia injections. On December 5th he was put on a bread and butter and milk diet, which the boy prefers, and the urine now became normal in reaction, of high spec. grav., with a persistent deposit of urates, no phosphates on boiling, and no reaction with Fehling's solution. With the exception of a slight attack of bronchopneumonia and the occasional presence of a yellow deposit with Fehling's solution, the boy has shown no unhealthy symptom, taking a hydro-carbon diet, Parrish's syrup and cod liver oil, looking bright and cheerful, sleeping well, and showing no nervous symptoms.

Case 10.—Mary B., a well-nourished, healthy-looking little girl, aged 22 months, and with 16 temporary teeth erupted, was brought to me in August, 1887, with the history that she had not been thriving for the past six weeks, pale, drowsy, occasionally fractious, with capricious appetite, frequent vomiting, and a reddish urinary deposit. During a fortnight at the seaside she had improved generally, but the urinary sediment had changed to a "grey mealy deposit," which caused much local pain and irritation. The child had been in perfect health previously, and she looked well and showed no organic affection when I examined her. Her diet had been plain, milk and farinaceous, with little sugar

or sweets, and she would not touch soup or meat. The urine brought was 1025 acescent, pale straw, with a thick mealy deposit of stellar and prismatic phosphates, no albumen.

Advice was given as to general hygiene and the local irritation, and a milk diet with Mellin's food and Parrish's syrup prescribed for a week, at the end of which time she was brought to me very little altered, except that the urine was now markedly acid, the phosphates had ceased to deposit, being replaced by uric acid and urates. I now adopted the treatment prescribed for Case 9, and under this the urine soon became normal, and she got rapidly well. If, however, the alkali was intermitted, the urine diminished in quantity the uric acid deposited, and she became pale and drowsy, with capricious appetite and tendency to vomiting.

About the same time I had an almost identical case in a little girl of four years, with the golden hair and pink complexion that mark a type of the rheumatic diathesis. In her the most troublesome symptom, in addition to the nervous condition, was frequent nocturnal diarrhoea. Under similar treatment she recovered perfectly.

I have no doubt, from my invariable habit, that on the first occasion I examined the urine of both these cases for sugar, but I have no note of the fact, and I am sure I should not then have been so careful in watching it while cooling as I now am, nor should I have thought of examining it for sugar subsequently.

Case 11.—Miss Jane K., aged 34 years, consulted me in October, 1888. She had been troubled for eighteen months with paroxysms of flatulent colic and migraine, and for two years she had persistently had a copious deposit of phosphates in her urine, which was 1025, neutral and otherwise healthy. She had had acute rheumatism in girlhood, apparently with no bad result. She was dieted, and put on a course of alkalies, with the result that the attacks of colic and migraine entirely ceased. The urine remained throughout this and subsequent treatment persistently neutral or alkaline, with as copious a deposit of phosphates as before. She expressed herself as being in excellent health.

Case 12.—Mr. John D., aged 33 years, apparently in excellent health, was sent to me in February last by his medical man on account of his invariably, for the past eight months, passing phosphatic urine at 11.30 a.m. Two years ago he became sleepless from business anxieties, but he has otherwise been a healthy man, and he is free from anxiety now, and feels better than he has for years. No medicine or alteration in diet has made the slightest difference. His urine ordinarily is quite clear and perfectly normal, and that passed about 11.30 a.m. is also normal except for its diminished acidity, while that passed before breakfast is abnormally acid. He is a copious meat eater, but shows no sign of gout. I considered the condition physiological, merely a somewhat lower dip in the normal wave of acid excretion.

It will be seen that only in the first two of these four cases was there evidence of the nervous system being involved, and these both children. The boy Ernest C. was sent to Queen Square with symptoms pointing very strongly to organic brain disease, meningeal inflammation or cerebral tumour. Whether the boy did actually suffer from intracranial inflammation or heat-stroke three years before I cannot of course say, but my belief is that he did not, that the attack was one similar to the one here recorded, but more acute. It is scarcely necessary for me to point out the importance of recognising such cases. They are most liable to be mistaken for intracranial tumour and tubercular or traumatic meningitis, the prognosis of which is very different from this. The presence of phosphaturia and the facts that the knee jerks are normal and that there is no optic neuritis are of immense value in the differential diagnosis. It should, however, be borne in mind that phosphaturia is a not uncommon symptom in gross intracranial disease, and the common disappearance of the knee jerks in tubercular meningitis is a comparatively late symptom generally. Also optic neuritis, both in meningitis and in intracranial tumour, may appear either early or late.

The absence of the more positive and localising symptoms of the gross diseases will assist in coming to a conclusion, and the progress of the case will soon give grounds for a decision. The ocular condition in the case of Ernest C. is recorded as a rarity rather than as being directly connected with the subject.

That this condition of phosphaturia is in some cases allied to diabetes is, I think, certain, whether one accepts the term "phosphatic diabetes" used by Teissier in his able monograph on the subject or not. The cases he records go far to prove his position that it is an affection not less definite, although less common, than diabetes mellitus, and also that the one may pass into the other. In the case of the boy Ernest C. there was undoubted excretion of sugar from time to time. I am quite aware that uric acid and urates may cause a deposit in Fehling's solution somewhat resembling that produced by sugar, but the deposits differ in colour and in mode of precipitation, and I do not think there is ever much difficulty in distinguishing them. Should there be such a difficulty, it is always possible to control the observation with picric acid and liquor potassæ.

In Case 10 phosphates and uric acid alternately deposited according to the reaction of the urine, and it is usually stated that such an alternation is purely a matter of the reaction of the urine, in no way depending on the phosphates and uric acid present; but not only is the reaction of the alternating urine altered, the colour and spec. grav. alters also as I have observed. I am quite aware of the possibility of fallacy in consequence of a change in the urinary reaction, but I am not prepared to admit that the above apparently simple explanation of the alternation has been proved, and if it had been proved I should not without further proof admit that it was simple. The reaction of the urine can with great ease be altered from acid to alkaline temporarily, and it can with some difficulty be altered from alkaline to acid in

most instances, but, as illustrated in two of the cases referred to above, it is not always easy to alter the reaction of urine, and in some cases it seems practically impossible to do so even temporarily. A permanent alteration of the reaction of the urine, apart that is from the mere excretion of acid or alkaline drugs, implies a most radical alteration of the whole constitution, and mainly perhaps of hepatic digestion. An alteration of diet can do a great deal, as indicated in the above recorded cases, either to alleviate or to aggravate the troubles ; and the admirable work recently published by Dr. Haig in his University Thesis and elsewhere establishes this fact in incontrovertible, as well as interesting, fashion. The fact that uric acid, phosphates and sugar can and do alternate in the urine indicates, I think, a closer relation in their inception, at least, between gout, rheumatism, diabetes, and the phosphatic habit than we have been accustomed to accept. The work of establishing this relation must largely rest with the experts in organic chemistry, but clinical results such as those above recorded may be of some value in the process. I do not apologise for publishing this paper in an ophthalmic journal, for I think it the best and most hopeful feature in ophthalmology that it has relations, closer or more remote, with every branch of surgery and medicine.

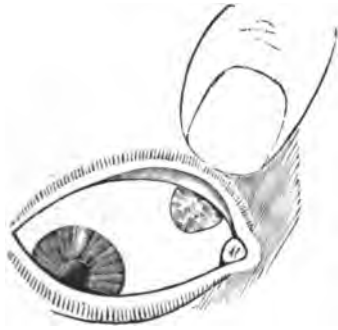
LEUCOSARCOMA OF OCULAR CONJUNCTIVA.

BY KARL GROSSMANN.

On October 12th, 1888, Mrs. E. C. was sent to me from Derbyshire on account of some inconvenience and pain in the right eye, experienced by her lately, and arising from a little "wart." The history of the case was

a short one. Patient did not recollect to have ever had a blow on, or any inflammation of either eye ; she was of a healthy family, and did not remember any cause for her present complaint. All she could say was that about five or six months ago she began to experience some pain, which was of a slight and intermittent character, in her right eye. The seat of this pain seemed to be towards the upper and inner corner of the orbital margin ; and sometimes a feeling of pressure was also noticed.

Condition when seen : A healthy-looking woman, 30 years of age, well nourished ; nothing abnormal in any part of the body, as was afterwards confirmed by a most careful and thorough examination.



Left eye in all respects normal ; $V = 1$.

The right eye looks equally normal to a superficial glance. The lids close and open well ; the cornea is clear, and no injection to be noticed. Still, in some movements of the eye, especially when looking downwards and outwards, there appears under the inner part of the upper lid a slight prominence, which can be felt through the lid by the finger, as a small nodule about the size of a lentil. By telling the patient to look as far downwards and outwards as possible, and by pulling the lid up at its inner angle, a small roundish, indistinctly lobulated body became visible, as shown in the woodcut.

It was situated between, and a little behind, the insertions of the tendons of the superior and internal rectus, movable on the sclerotic, and covered by the conjunctival epithelium, which was quite intact. Its consistency was rather hard, as far as could be ascertained in so small a formation, its colour yellow, like that of pinguecula, and it was hardly at all vascular, except in the posterior part, which was only brought into view with some difficulty. There was some tenderness on pressure which remained after instillation of cocaine.

Vision was as perfect in this eye as in the other. The diagnosis made was subconjunctival fibroma or lipoma. From the colour and the slightly lobulated appearance, the latter seemed the more probable.

The excision was performed on the same day without difficulty. Cocaine was instilled, the conjunctiva incised meridionally, and the little tumour shelled out easily. Hardly any bleeding followed.

The wound was closed by one horsehair suture, which was removed two days later, and after four more days, the patient left for her home.

The tumour was cut in two immediately after removal. The knife showing no fat on its surface, and the tumour being rather hard, fibroma was thought the only probability. It was put into Müller's fluid for a week, and then sections were made. The patient had already left, when it was examined microscopically, to my surprise, I found typical appearances of sarcoma; round and spindle cells, the latter predominant, with all possible transitions, were arranged in the characteristic roundish agglomerations. Not a trace of fat nor of pigment could be detected, and the growth was not very vascular. I showed several sections of the tumour at the following Microscopical Meeting, and no one thought any other diagnosis possible, from the microscopic appearance, than sarcoma.

The patient has been examined most carefully since this ominous microscopic evidence. However, not a

single morbid symptom has been found anywhere, and at this present moment—four months after the operation—she is enjoying excellent eyesight and perfect health. She will be watched, and should any symptom of local or distant new formation show itself, I shall report it in this Journal.

R. DEUTSCHMANN (Hamburg.) Ophthalmia Migratoria. Sympathetic Ophthalmitis. *Leopold Voss (Hamburg, 1889).*

Deutschmann ascribes to Le Dran, A.D. 1740, the credit of the first published description of the disease (which Le Dran believed to travel through the optic nerves); at a later date observations by Beer, Huxley, Desmours, and Von Ammon preceded the work of Mackenzie, who in 1844 first really brought sympathetic ophthalmitis home to the understandings of oculists in general. Mackenzie recognized three possible methods of transmission:—(1) Through the blood vessels in their close intracranial connection: (2) Through the ciliary nerves by reflex action; (3) Through the optic nerves themselves. Heinrich Müller (1858) rejected this third theory as impossible, owing to the atrophy of the opticus, and the effect of his observations was to establish the ciliary nerve theory as the dominant one for nearly a generation.

Inflammatory processes observed in the ciliary nerves and their sheaths lent support to this hypothesis, though the absence of such inflammation in some eyes, enucleated for causing sympathetic disease, argued to the contrary, as also its presence in eyes which caused no sympathy. Mooren and Rumpf, in attempts to excite sympathetic ophth. in rabbits, only succeeded in producing hyperæmia, and by degrees other theories sprang up in opposition. Colsmann (1877) attributed the disease to an inflammation travelling up the nerve sheaths to the chiasma, and so down to the second eye. Knies (1879) found the pial sheath of the nerves inflamed in a case of double serous iritis, and sug-

gested that sympathetic ophthalmia could probably travel the same way. In 1879 again he pointed out the distinction between irritation produced by the medium of the ciliary nerves, and inflammation, a process spreading along the sheaths of the opticus. MacGillavry (1880) found cellular infiltrations in the subdural space of the opticus, and subsequently adopted the theory of a continuous extension of inflammation. Berlin (1880) suggested that sympathetic ophth. was a metastatic disease, germs travelling harmlessly in the blood vessels till they reached the second eye, where similar conditions as to soil or light enabled them to develop as they had in the first. Leber (1881) asserted that the disease extended by contiguity and continuity of tissue, and only occurred after an infectious septic inflammation of the exciting eye. Snellen (1881) also opposed the ciliary nerve theory as wanting proper proof. He regarded the disease as a peculiar form of septic choroiditis, and believed it followed the lymph paths.

Deutschmann's view is essentially that of Leber. His first experiments were published in 1882 in Græfe's Archives (*vide* O. R. ii. 22 ; iii. 304 ; and iv. 12). His first success was obtained by injecting the spores of *aspergillus fumigatus*, and then by injecting croton oil. He found the opticus and its sheaths inflamed, the inflammation decreasing towards the chiasma, to increase again as it descended to the second eye. As these agents probably excite inflammation as chemical irritants, he used microbes, and found in *staphylococcus pyogenes aureus* and *albus* the material he wanted. Injection into the vitreous of the rabbit set up chronic irido-choroiditis, with purulent infiltration of vitreous, and papillitis, ending in phthisis bulbi. The second eye in from five days to three weeks exhibited papillitis, but the rabbits died before typical irido-choroiditis had time to develop.

Deutschmann accordingly concluded that the optic nerve and its sheaths formed the track by which sympathetic inflammation extended from eye to eye. As experiment showed that the lymph stream round the opticus flowed towards the globe, he assumed that the microbes had more difficulty in passing up from the first than down to

the second eye, and the ease of this downward journey accounted for the rarity of meningitis.

Alt, Gifford and Mazza have made similar experiments. Mazza injected staphylococcus pyogenes, and though the infection spread to the second eye, he believes it proceeded by way of general meningitis. Alt produced transient sympathetic neuro-retinitis by croton oil, and both transient and malignant by infusion of abrus precatorius. He concluded that the opticus and its sheath carried the inflammation. Gifford, having failed with staphylococcus, succeeded with the bacillus of cattle anthrax, but found that the inflammation travelled from the vitreous along the central retinal vessels (and not up the nerve sheaths) to the cranial cavity.

Gifford's views on the intraocular lymph streams support his theory of sympathetic ophth., and Deutschmann has repeated Gifford's experiment of injecting Indian ink into rabbits' vitreous. Gifford traced the pigment subsequently along the central vessels passing out of the opticus back to the apex of the orbit. Deutschmann's results agree in part with Gifford's, but he also found the pigment in the sub-vaginal space close to the globe. It reached this space from the central vessels either by passing along radiating vessels in the opticus, or by getting caught in the descending lymph stream at the point where the central vessels leave the nerve, and it gradually left the vessels after they had reached the orbit, so that none could be traced to the apex of that cavity. By injections into the orbit itself he found that the pigment passed downwards and inwards between Harder's gland and the infraorbital gland, along the membrana orbitalis, then forwards to pass through a fissure at the inferior border of the orbit, and spread itself on the surface of the superior maxilla. The pigment did not pass out of the orbit into the cranium. If it did in Gifford's experiments it could not have been free pigment.

These experiments show that the lymph stream in the intervaginal space runs towards the eyeball, and then passes partly into the orbit along the central vessels, partly into the supra-choroidal space, whence it gets into Tenon's capsule along the vasa vorticiosa, and so into the orbit. A

third stream passes through the dural sheath into the supravaginal space, and so also into the orbit. Gifford's views are essentially the same.

Deutschmann then submits Gifford's pathological experiments to a detailed criticism, and concludes that Gifford has in no one of his three successful inoculations demonstrated the passage of the microbes from the orbit into the cranial cavity, but that his experiments tend to prove that their path from eye to eye is along the intervaginal space.

Deutschmann has obtained 12 positive results from some 34 inoculations, and in the successful cases has traced the micrococci from the vitreous along the central canal of the opticus accompanying the vessels, while the latter were in the nerve. Further back the collections of cocci were to be found in the intervaginal space of the nerves, and the piamater of the chiasma—hardly any colonies were detected in the orbital tissue itself. The experiments seem to have been restricted to rabbits.

Bacilli and cocci affect the eye differently. The former grow more rapidly, but set up less inflammation. The latter produce dense cellular infiltration round the sheaths of the central vessels, which prevents the advance of the cocci out into the orbit as the pigment granules do in physiological experiments. They then, Deutschmann holds, work their way through lymph paths up stream to the chiasma.

The intervaginal space is the true path taken by the cocci, the optic nerve itself is only implicated secondarily. The cocci reach this space either directly from the choroidea into the pial sheath of the opticus, or along the radiating vessels in the opticus. They may also pass from the suprachoroidal space, but Deutschmann has not seen this.

Gifford's observation that the splenic fever bacilli pass into the suprachoroidal space of the second eye is of importance as explaining the rapid infection of the uveal tract. Deutschmann has not found the cocci in this situation (owing to the early death of the rabbits). He believes, however, that inflammation spreading from the inner sheath of the opticus may infect the choroidea earlier than it does the

substance of the papilla, and may also reach the suprachoroidal space in the manner described by Gifford.

Micro-organisms had been found in human eyes enucleated for causing sympathetic ophth. before Deutschmann demonstrated their existence for the first time by the modern methods of staining and cultivating in 1884. Snellen, in 1881, found small mobile bodies in the optic sheath—apparently micrococci. Leber also in 1881 found similar bodies, and Abraham and Story in 1882.

Deutschmann now reports 20 cases of sympathetic ophth., in which he examined the exciting eye microscopically. Most of the cases have been previously published. The first 12 are reported in O.R., vol. iv., p. 12. In only six of them could microbes be searched for, and in five of these they were found. In all the eight new cases micrococci were found in the exciting eye, and in three of them they were in the intervaginal space of the opticus.

To the above Deutschmann adds one case of Jacobson's (examined by Vossius), and one of Wedl's and Bock's, in which microbes were found. Sixteen cases published by Berger, in fourteen of which the nerve sheaths were inflamed—microbes apparently not searched for. (In a subsequent case Berger found micrococci in the nerve sheath). Alt and Ayres failed to find microbes in a case they investigated.

Deutschmann has demonstrated that the microbes in eyes exciting sympathetic ophth. are veritably pathological by cultivating them in blood serum. The cultivations produced colonies of typical staphylococcus pyogenes albus and aureus, and the cultivations possessed the same malignant characters as their progenitors when inoculated into rabbits' eyes.

Pathological microbes have been found by Deutschmann in the sympathising eye in five cases, of which one at least has been previously published. Cultivations from pieces of iris or from aqueous humour produced colonies of staphylococci either white or yellow, and inoculation demonstrated their pyogenic character.

At the Heidelberg Congress of last year Sattler advocated the opinion that sympathetic ophth. could not be caused by pus bacteria, because for one thing suppuration of the second eye does not occur (except as an extreme rarity). To this

Deutschmann replies that *staphylococcus pyogenes* is recognised in surgery as the author of chronic inflammation, and that it is only reasonable to suppose that the microbes must have lost some of their original energy in their passage from eye to eye. He found them smaller than in the exciting eye, but does not believe, with Sattler, that they are actually a different species of microbe.

It is easy to show that the theory of infection is justified by clinical facts, by searching through the literature and ascertaining that septic infection is a probable or possible occurrence in nearly every eye which has excited sympathetic disease. It is probable in every case where perforation by injury or disease occurred in the exciting eye, and it is generally acknowledged that sympathetic ophth. without such perforation is an event of the greatest rarity. The perforation of the globe by gonorrhæal ophthalmia may lead to it, and it seems that the sympathetic disease is caused not by gonococci, but by the same microbes as in the common cases. Deutschmann allows that other microbes may possibly produce sympathetic disease (he has found tubercle bacilli in the intervaginal space of the nerve), but the pyogenic coccus is the microbe whose action has been proved.

The rarity of sympathy after suppurative panophthalmitis is not opposed to the theory laid down; for, as Leber holds, the cocci may be expelled by perforation, or rendered inactive by the profuse suppuration, or, as Gifford assumes, the lymph paths may be mechanically sealed up by lymph cells.

Deutschmann rejects the cases of so-called sympathetic disease excited by wearing of artificial eyes, as either not sympathetic at all, or occasioned by some cause other than the presence of a glass eye.

Bony formations in the choroid have been assigned as the cause of sympathetic ophthalmia in many cases; but in all these the eye had been first lost by injury, and therefore infection is a probable supposition.

Tumours, too, have been reported to cause it, but in most of the cases there was either a history of antecedent injury, or the tumour had perforated, and, therefore, probably septic infection had occurred. But Deutschmann himself

has seen an eye in which a melanotic sarcoma existed along with chronic inflammation (cocci and double cocci) and no antecedent injury whatsoever. Of course, suppurative inflammation may arise without external wound in the eyeball as in any other cavity of the body.

The occurrence of sympathetic disease after enucleation is no objection to the theory; and the fact that a certain time always elapses between the injury of the first eye and sympathetic disease of the other, of course supports it. The time certainly varies from 10 days (the earliest time recorded in any case allowed by Deutschmann to be genuine) to many years—in one case to 35! The long intervals are accounted for either by the vitality of the microbes or by some subsequent infection.

The anomalous forms of sympathetic disease which have been described are criticised strenuously. The discolouration of the cilia (of one or both eyes) is dismissed as a mere coincidence.

Sympathetic conjunctivitis, described by Galezowski, Webster, and Brailey is rejected completely, as are also scleritis, keratitis, cataract, retinal detachment, and opacity of the vitreous; and only the classical irido-choroiditis is allowed to claim the title of sympathetic inflammation, sharing the honour with neuro- and chorio-retinitis, of which many cases have been described in modern times.

The few cases of "sympathetic" atrophy of the nerve which have been published do not in any wise invalidate the theory, as it is possible that the inflammation may have subsided after having caused so much damage behind the globe as to lead to atrophy as in retrobulbar neuritis.

Although usually sympathetic disease is a chronic inflammation without visible suppuration, pus has been observed in some cases—in one by Gunn, one by Webster Fox, and one by Deutschmann. (The cases of Landesberg and Schneider are rejected.)

The operations admissible for the protection of the second eye are enucleation, evisceration, neurotomy of opticus with or without resection. Enucleation is the most certain, but evisceration with disinfection of the interior of the globe effects the same object, and for eyes in a state of

panophthalmitis is a better operation. Simple neurotomy cannot be certain in its results, and Leber has published a case of sympathy $2\frac{1}{4}$ years after resection, but resection of a 10 mm. piece of the nerve, as practised by Schweigger, should fulfil the indications, although Clausen has published a case where sympathy followed within 17 days of such an operation.

As the most rational treatment (in addition to the removal of the exciting cause) an early iridectomy and repeated parencetesis of the anterior chamber is proposed. Mercury to be given at the same time, and corrosive sublimate to be dropped into the conjunctival sac as proposed by Gallenga.

J. B. S.

SCHIRMER (Göttingen). The Pathological Anatomy of Congenital Atrophy of the Optic Nerves. *Arch. f. Ophth. XXXIV.* 4, p. 131.

The nerves examined and described by Schirmer were obtained from a patient of Professor Magnus, of Breslau. The clinical notes of the case were published by Jacobsohn in the "Centralblatt f. prakt. Augenheilkunde," Dec., 1888, and from them the following brief abstract is taken:—

"The patient, a female child, was brought, when five months old, to Magnus' clinique with bilateral congenital optic atrophy. She was the seventh child of healthy parents, and her brothers and sisters were living and strong, with the exception of No. 4, a boy, who also had congenital optic atrophy, and died, when *æt.* $2\frac{3}{4}$ years, of pneumonia. The patient was well nourished, the skull of normal dimensions, although the occiput appeared rather flattened. No evidence of rickets, eye-balls normal, pupils half wide and motionless, no nystagmus. She did not follow movements of the hand or bright objects. Ophthalmoscopic examination revealed a grayish white pallor of discs. They appeared of normal size, and their edges were slightly blurred, but the scleral ring was plainly visible, and in other respects there was nothing abnormal."

The child died, when between seven and eight months old. The brain, the optic tracts and chiasma, and the eye-balls with the optic nerves attached, were hardened in

Muller's fluid, and subsequently in alcohol ; then embedded in celloidin. Transverse sections were made and stained with Weigert's hæmatoxylin, nigrosin and picro-lithia-carmine.

The optic nerves were not noticeably slender ; immediately behind the globes they exhibited an unusual degree of swelling, not wholly due to thickening of their sheaths. Microscopically, there were evident in both nerves scattered patches of degeneration, which varied in degree in different sections, but from which no bundles of fibres were quite exempt. The total number of fibres appeared smaller than in healthy specimens, and they were less closely packed, the intervening spaces being small and circular. In certain bundles there was atrophy of the fibres extending from the periphery towards the centre in the form of a band, which, widening here and there, divided the bundles into several sectors. These bands had a finely reticular structure, and the connective tissue supporting the fibres seemed more delicate than in health. In the peripheral part the endoneurium exhibited long spindle-shaped meshes, which the author considers result from shrinkage of the nerve elements, and not from the hardening process. There were no traces of previous inflammation, no new vessels, no increased nucleation, and no thickening of fibrous septa, except in one small area at the periphery of the right O. N., about the middle of its orbital part.

In portions of the nerves prepared by teasing the fibres could be easily isolated, and there were then found, in addition to fairly healthy-looking fibres with characteristic varicosities, others, slender and pale, with minute varicose enlargements, evidently in various stages of degeneration. This change was present in the whole length of both the nerves, but unequally distributed. In the left they were most evident in the immediate vicinity of the eye-ball, at which part the whole transverse section exhibited a partial atrophy, and the most peripheral bundles were completely destroyed. Nearer the apex of the orbit the atrophic changes were less advanced ; the fibres more nearly filled the meshes of the endoneurium, and the interstices were few and small ; the peripheral bundles also were less degene-

rate. A short distance anterior to the chiasma the nerve appeared quite normal.

In the right nerve the atrophy was, on the whole, more advanced, especially in the posterior half of the orbital portion. Near the optic foramen, on the temporal side of the nerve, the fibres were almost completely destroyed, and there were other scattered patches in which the degeneration was nearly as complete. In these situations there was no increased nucleation. The endothelium of the inner sheath was considerably thickened, and in the inter-sheath space were found multi-nucleated giant cells, which differed from those commonly seen in tubercle, in that the nuclei were placed in the centre of the cell, and not collected at its margin. The outer sheath appeared normal.

Attached to the right nerve-sheath near the *canalis opticus* was some delicate fibrillated tissue, which was undergoing ossification. The author is unable to explain its origin or significance.

The eye-balls, when bi-sectioned, appeared macroscopically normal; examined with the microscope, however, the following changes were observed:—

The papillæ projected 0.75 mm., and their nerve fibres were somewhat separated, and ran an irregular course. There was also noticeable increase in the interstitial connective tissue. The retina had undergone some post-mortem maceration, whereby the rod and cone layer was much altered; but, in addition, changes had occurred *intra vitam* in the inner layers, consisting mainly of an interstitial connective tissue growth. The Mullerian fibres were elongated, and between them a finely reticulate tissue was observed, in which were numerous nuclei. It was very noticeable in the nerve fibre and ganglion cell layers, and in many places it stretched in a fine net-work over the inner surface of the retina; its meshes appeared to be filled with clear fluid contents. These changes resembled those met with in chronic retinitis of the inner layers, as seen, *e.g.*, in lues.

Nothing abnormal was detected in the chiasma, optic tracts, or cortex of the occipital lobes.

The author remarks that the colour of the discs, observed

ophthalmoscopically, and their blurred edges, are explained by the increase of connective tissue among the nerve fibres. The interstitial changes in the inner retinal layers would scarcely be recognisable, even if present in a high degree, and when but slight, as in the present case, would easily escape detection by the ophthalmoscope. The loss of function (the absolute amaurosis indicated by a complete absence of pupil reaction) does not quite tally with the anatomical conditions. The partial atrophy of the nerves, which was not very advanced, seems scarcely sufficient explanation for the blindness.

Schirmer considers the case to be one of simple "grey degeneration," but notes that the proliferation of endothelium of the inner sheaths was suggestive of antecedent inflammation. However, a similar change has been described by Leber* in three cases reported in 1868. Assuming the conditions to be post-neuritic, the absence of increased nucleation in the nerve might be explained by the fact that the inflammatory process had passed off, and that the absorption and removal of degenerate nerve substance was already far advanced.

In favour of primary atrophy are—the extent of the changes in cross sections of the nerve, their varied localisation in different parts of the same nerve, the preponderating share taken by the most peripheral bundles of fibres, and the absence of new vessels or any considerable increase of connective tissue.

The retinal changes are not sufficient for the case to be classed as one of retinal amaurosis. It belongs properly to the rare group of cases of congenital optic atrophy, and is, so far as the writer is aware, the first case examined microscopically.

J. B. L.

* Arch. f. Ophthal. XIV. 2, 164.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, MARCH, 14TH, 1889.

J. W. HULKE, F.R.S., President, in the Chair.

Colour Blindness and Colour Perception.—Dr. Edridge-Green read a paper in which, after mentioning in detail the objections, which seemed to him of greatest importance, to the Young-Helmholtz and the Hering theories of colour vision, he explained at length his own views and the theory which he had built up as a result of numerous experimental examinations of persons with normal and defective colour perception. He held that the colour perception centre of every individual was able to appreciate a certain number of units of colour, these units corresponding more or less closely to the bands of the solar spectrum. The average number of units was six, namely: red, orange, yellow, green, blue, and violet; but persons of unusually good colour perception possessed a seventh, namely, indigo or dark blue, which was placed between the blue and the violet. In people whose colour perception was below the average, one or more units of colour would be wanting; orange was the first to disappear, and it was replaced by a widening of the red and yellow bands. Such an individual would belong to the five-unit class. Blue was the next band to disappear, the violet then extending to the normal blue-green junction. The next band to fail was the yellow, the red then reaching to the green. The green and red then became as one band, and so the units were reduced to two, the violet still remaining; in total colour-blindness these two were replaced by a neutral band. Dr. Edridge-Green gave the following "laws of colour perception," which he deduced from the facts obtained in his investigations: 1. An individual can have no conception of a colour which does not form one of his psycho-physical colour units, or a very apparent modification of one of them. 2. If the colours belonging to two adjacent units be mixed, an impression of both units is obtained

which is plainly perceived as a mixture. 3. If two colours not adjacent be mixed, the intermediate colour will tend to be brought before the mind, or white will be the result in the case of pure light, gray where there is partial absorption. 4. If any number of colours be mixed, the resulting impression will be that of a unit, a modified unit, or white. Dr. Edridge-Green exhibited and described a series of tests for colour-blindness, which had been made for him, consisting of coloured wools, silks, ribbons and cardboard.

Arterial Aneurysm pressing on the Optic Commissure, causing Distension of Optic Sheaths, Œdema of Retinæ, etc.—Mr. Jonathan Hutchinson, jun., read notes of the case of a man, aged 29, affected with ulcerative endocarditis, who died in the London Hospital, under the care of Dr. Sutton. About twelve days before death he complained of rather sudden loss of sight in both eyes, vision being reduced to counting fingers. On examination, the retinal arteries were found extremely small, the veins much diminished, the retinæ white and hazy, and containing scattered hæmorrhages; these appearances remained unchanged and no improvement in sight occurred before death. *Post mortem*, a small aneurysm was found, lifting up and pressing on the chiasma. It seemed to arise from the end of the basilar artery, and dipped into the pituitary fossa. Both optic nerve sheaths were greatly distended behind the globes, and the lymph spaces in the nerves and immediately beneath the pial sheath were much dilated. There was, in addition, slight retrobulbar neuritis; the central vessels were small but normal. Mr. Hutchinson considered that the case was of interest in connection with the view held by Deutschmann and others, as to increased intracranial pressure and simple distension of the optic nerve sheaths not causing optic neuritis, but anæmia and œdema of the retinæ, with hæmorrhages. It seemed to agree with this theory, there being no intraocular neuritis, but only slight infiltration, with leucocytes in the nerves behind the globes. During life it had been suggested that symmetrical embolism of the retinal arteries was the cause of the amaurosis.

Dr. James Anderson was unable to agree with the conclusions of the writer, and did not think the case threw much

light on the causes of optic neuritis. The aneurysm must have existed for some length of time, whereas the loss of sight came on suddenly, and shortly before death. Aneurysms of the cerebral arteries in association with rheumatism were not rare, but not necessarily accompanied by ocular symptoms. He thought the amaurosis in this case was probably part of a general blood-infection such as occurred in cases of septic endocarditis.

Mr. Hartley mentioned a case in which double proptosis and uniocular optic neuritis had come on from three to six months after fracture of the base of the skull. The inflamed optic nerve passed into atrophy, and the proptosis slowly subsided. He had diagnosed an intracranial aneurysm pressing on the optic nerve.

Mr. Doyne looked upon the case Mr. Hartley had mentioned as one of retrobulbar neuritis, with consecutive changes in the discs. He did not think Mr. Hutchinson's case supported Deutschmann's views, but was of opinion that the aneurysm had set up a localised meningitis, and that inflammation had extended from this down the optic nerves.

Dr. Herbert Habershon asked the cause of the aneurysm, whether due to arterial degeneration or embolism, and spoke of a case in which a cerebral artery became embolised, and an aneurysm formed on the cardiac side of the embolus.

Mr. Hutchinson, in reply, said the cerebral arteries had been carefully examined, and showed no further abnormality. He thought the fact that no abscesses formed, and no further changes occurred in the retina, went against the idea of septic infection. The symmetrical failure of sight was in favour of embolism.

Retinal Changes in Chronic Alcoholism.—Messrs. Edmunds and Lawford communicated the results of ophthalmoscopic and microscopic examination of the eyes of a man who died from alcoholic paralysis and heart-disease. The ophthalmoscopic changes consisted of widespread haze of retina, without hæmorrhage or localised exudation. Sections of the retina revealed slight œdema of the nerve-fibre layer in the immediate vicinity of the optic disc, and well-marked œdema spaces in the outer granule layer, in which spaces were round

and oval masses of clear homogeneous effusion. Attention was drawn to the rarity of retinal disease in alcoholism; the only recorded case, so far as the authors were aware, being one brought forward by Dr. Sharkey, at the discussion on chronic alcoholism, at the Pathological Society, in December 1888.

Card Specimens.—The following patients and card specimens were shown :—

Mr. Lawford : Drawing of Localised Choroidal Atrophy, with narrowing of overlying retinal artery.

Mr. Phillips : (1) Case of Unusual Atrophy of Choroid ; (2) Case of Peculiar Form of Amblyopia.

Messrs. Critchett and Juler : Case of Absence of Convergence.

Mr. Critchett : Hirschberg's Hot water Apparatus for Sterilisation of Instruments.

Mr. Ernest Clarke : (1) Nævus on Sclera ; (2) Persistent Pupillary Membrane.

Mr. Morton : Subhyaloid Macular Hæmorrhage.

Mr. Doyne : Choroidal Changes due to Blows upon the Eyes.

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HESS. Experimentelles über Blitzcataract.

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MANZ. Ueber die Genese des angeborenen Iriscoloboms.

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Report of Heidelb. Congress, 1888, p. 135.

PRIESTLEY SMITH. Glaucoma Pathology,

Report of Heidelb. Congress, 1888, p. 224.

SNELLEN. Die Behandlung des Glaucoms.

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SOME NOTES ON OPHTHALMOLOGY IN TURKEY.

BY PERCIVAL J. W. TERNAU, L.R.C.S.I., L.K.Q.C.P.

These notes were taken while acting for some months as clinical assistant to Dr. Van Millingen, at the Strangford Eye Infirmary, Constantinople. I offer them for publication in the hope that, imperfect as they are, they may prove not uninteresting to ophthalmologists in this country, as representing to some extent the views and opinions of Dr. Van Millingen, admittedly an able and industrious worker in the vast field which is presented in Turkey for the study of ophthalmology. I purpose in the present article to confine my remarks to the methods made use of at the Strangford Eye Infirmary for the diagnosis and treatment of some of the more commonly met with conjunctival diseases.

An *epidemic* form of *acute conjunctival catarrh* is very common in Turkey. It occurs in spring and autumn, is frequently very acute, with much secretion, swelling of the lids, chemosis of ocular conjunctiva, and distressing sensation of grit (relieved by raising the lid), accompanied with pain, especially at night. Several members of a family may be attacked, one after the other. Some cases recover without treatment in eight to fourteen days. In the acute stage this affection is treated by syringing out the conjunctival sac every two hours with a tepid 3 per cent. solution of boracic acid. Cocaine is used at night for the relief of pain. If the pain is so severe as to prevent sleep, chloral is given.

K

The differential diagnosis from *acute trachoma* is made by observing the even appearance of the palpebral conjunctiva, and the considerable extension of the inflammation over the ocular conjunctiva two or three days after the appearance of the first symptoms.

Chronic or simple catarrh is also common. In the treatment attention is paid to the condition of the nasal duct, canaliculi and meibomian glands, and any error of refraction is remedied.

Further treatment consists in the use of nitrate of silver, in solution, applied with a syringe to the everted lids.

I may here take occasion to remark that at the Strangford Eye Infirmary all solutions are applied to the conjunctival sac by means of a syringe; in no case is a brush used. In this way any danger of case to case infection is avoided.

Catarrh localised to the retrotarsal fold of the upper lid (*Schwellungscatarrh*) occurs frequently. Complete eversion of the upper lid is necessary for the detection of this condition. This affection may be confused with both trachoma and follicular conjunctivitis, as the former always commences in the retrotarsal folds of the upper lids, and the latter is also localised at this part. The differential diagnosis from both these diseases is made by observing that in *Schwellungscatarrh* the surface of the swelling is homogeneous, without asperities of any kind. Excoriation of the skin at the outer canthus is generally present.

Catarrh of the retrotarsal folds accompanies chronic cases of corneitis, especially in strumous children, in whom the swelling may be very great. The treatment consists in the application to the everted lids of pure liquor plumbi subacetatis, which is immediately washed away. It is interesting to note that Dr. Van Millingen, in his extensive use of this remedy, has never met with a case of lead incrustation. He of course is careful that

the lead does not come into contact with the cornea, and in cases where the catarrh is accompanied by ulceration of the cornea, this is treated first in the usual manner, and the lead not used until the ulcers have healed.

Follicular conjunctivitis (Trachoma Arltii) is considered to be due to the presence of lymphomata of the conjunctiva. On everting the lids in a case of this disease, there will be seen, close to the retrotarsal fold, a few elevations like boiled tapioca grains or frog spawn, increasing in number as they approach the fornix conjunctivæ, and ceasing abruptly at the ocular conjunctiva. At the inner corner of the retrotarsal fold of the upper lid, close to the caruncula, these lymphomata are grouped into a cluster, forming a raspberry-like tumour, of a pale yellowish or red colour, and slightly translucent. The absence of irritation or redness, and the normal transparency of the palpebral conjunctiva, which allows the meibomian glands to be seen, serve to differentiate this affection from trachoma. The sufferers are generally lymphatic children, pale, badly fed, and living in crowded houses. The symptoms may be slight, with no secretion, and no inconvenience to the patient, or may resemble those of ordinary catarrh.

The prognosis in these cases is good, complete recovery without residual cicatricial bands being the rule, if the patients can be put in better hygienic conditions, pure country air being especially desirable.

In Dr. Van Millingen's hands the best results have been obtained by the following treatment:—The irrigation twice daily of the conjunctival sac with a solution of perchloride of mercury. The lids are everted, and a steady stream from a wash-bottle is brought into contact with every part of the conjunctiva for some seconds. The use of liquor plumbi subacetatis has been found also to improve some cases; but, according to Dr. Van Millingen, sulphate of copper cannot be too

carefully avoided, as it increases the irritation when present, and brings it about if absent.

Corneitis may accompany this affection, either in the form of fascicular corneitis, or more generally as infiltrated ulcers, close to the centre of the cornea, rarely at its upper margin, having all the characters of superficial corneitis, without, however, having been preceded by pannus. These corneal complications will be found to improve steadily under the irrigation treatment. Atropine is never used in these cases.

A variety of true *trachoma* is not uncommonly met with, characterised by very few granulations, limited to the upper retrotarsal folds, of very acute character, with or without severe pain and pannus.

The following is the treatment made use of at the Strangford Eye Infirmary, and is founded on an experience of over 10,000 cases of trachoma, extending over seventeen years.

In the first stage, the conjunctival sac is irrigated three times a day with a solution of perchloride of mercury, in the manner described under follicular conjunctivitis. This procedure has a marked effect in arresting the rapid invasion of the conjunctiva, and is continued until acute symptoms have subsided.

During the second stage, in addition to the irrigation, sulphate of copper in polished crystal is used, at first three times a week, and, after improvement, every day.

In the third stage the irrigation is continued ; and if there be persistent pannus, or should there be any tendency to recurrence of granulation, occasional use is made of sulphate of copper.

When trachoma is complicated by acute corneal affections, sulphate of copper is not used until the acute stage is over. The cornea is treated by irrigation with sublimate solution, and if there are deep progressive ulcers, the galvano-cautery is used. Peritomy is never found necessary. Incision and excision of retrotarsal folds are condemned, as leading (after several years) to symplepharon posterior, and other untoward results.

A careful distinction is made between the pannus of trachoma and that of strumous ulcers of the cornea.

Thus a strumous child may have had trachoma, and have passed through all the stages. He may then have one, or several ulcers, resembling in every respect the ulcers after phlyctenular corneitis, situated at the margin, or close to the centre of the cornea. The treatment in such a case is the same as for a similar case without trachoma—namely, antiseptic, during the acute stage, and when that is over, calomel, yellow oxide of mercury, etc. Such combined cases are frequent in Turkey.

When trachoma is accompanied by chronic dacryocystitis, the lacrimal passages first receive attention, the trachomatous lids being meanwhile treated antiseptically, especially if the cornea is implicated. The sulphate of copper is not used until the duct is pervious, and has ceased to secrete. Broad phlyctenæ (*ulcus elevatum*) of the ocular conjunctiva, single or confluent, are often seen in cases of trachoma when chronic rhinitis or ozæna is present. For such cases the irrigation of the eye (with sublimate lotion, or chlorine water and water, equal parts) is used, and the nose irrigated with sublimate lotion until the phlyctenæ have completely disappeared. Pannus, with increased curvature of the cornea (*kerato-ectasia ex panno*), is treated by irrigation with sublimate lotion and eserine. In extreme cases iridectomy is resorted to.

Entropium with or without trichiasis, and trichiasis with or without entropium, are always operated upon by the Tarso-cheilo-plastic method. Ulcers of the cornea (not acute) and pannus rapidly improve after the operation.

Phlyctena Pallida (*Spring Catarrh*) is not uncommon in Constantinople. A considerable number of cases occur every year between the end of March and beginning of July. The only treatment which has proved efficacious, and has succeeded in curing some

mild cases, is the use of cocaine, which is dropped into the eye each time the itching commences.

Before concluding this article I wish to refer to a case of *essential atrophy of the conjunctiva* which came under my notice in Constantinople. The patient, a woman of 40, had never suffered from inflammation or increased secretion. She noticed, eight years ago, that the ocular conjunctiva commenced to become red between the inner canthus and the inner margin of the cornea. The appearance of the case, when I saw it, was: alopecia of the eye-lashes of lower lids, the intermarginal space dry and glistening, with a pale tendinous appearance, and the openings of the meibomian glands obliterated. Between the intermarginal space and the ocular conjunctiva there was hardly 0.5 mm. of thin atrophied shrivelled up conjunctiva. There was every appearance of symblepharon posterior after burns by quicklime. The ocular conjunctiva, opposite the lower lid, was injected, thickened, and somewhat raised close to the cornea. The retrotarsal folds were somewhat but very slightly shortened. (In cicatricial trachoma the retrotarsal folds of upper lids are the first to shorten). The palpebral aperture did not close completely when the patient tried to shut her eyes. She had had no hemiplegia, and in other respects was in perfect health.

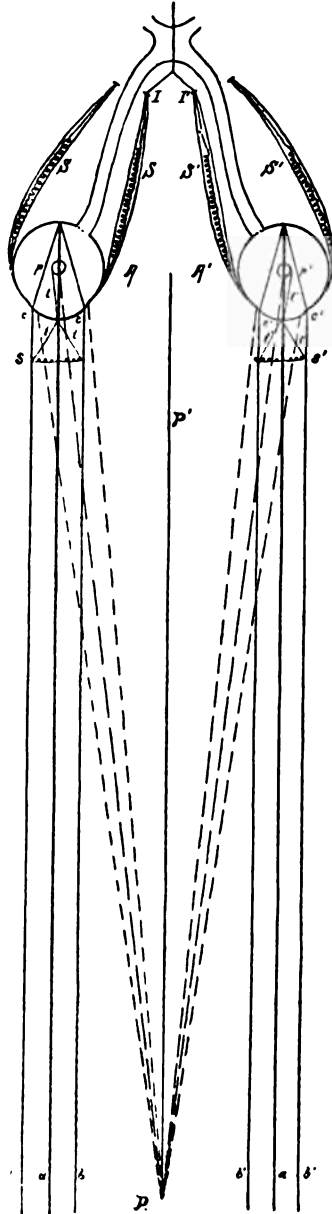
A MODEL TO DEMONSTRATE THE RELATIONS OF ACCOMMODATION AND CONVERGENCE.

By B. ALEXANDER RANDALL, M.D., PHILADELPHIA.

Following the suggestion of Mr. Priestley Smith's model illustrating the conjugated movements of the eyes, of which he had heard, the writer constructed a series of models as aids in a course of demonstrations of the Physiology of Vision given in the University

of Pennsylvania in the autumn of 1884. While independently made, these are for the most part identical with those of Mr. Smith, since described; but one seems to present points not before put into such shape, and is therefore deemed worthy of a brief notice.

The model consists of a large board upon which two discs (A, A^1), representing the eyes in sevenfold amplification, are pivoted. Each of these discs has three light wooden rods attached to its front, to represent the rays of light entering the eye, the central rod (a) being fixed to represent the axial ray, the lateral ones (b, b^1) pivoted upon the periphery of the cornea (c, c^1). Spiral springs (s, s) press these apart; while delicate threads (t, t) attached at the same points, a little in advance of the cornea, draw them together. These threads converge to pass through a small ring upon the axial ray, and are excentrically attached to the outer side of the pivot (p, p^1) upon which each eye-disc turns.



This pivot consists of a hollow pin around which the disc moves, which is firmly driven into the board, and having fitted into it, like a violin key, a pin with a groove cut in the edge of its broad head; and the threads falling into the outer part of this groove can be tightened or loosened by its rotation without change in the excentricity of their attachment. Spiral springs (S, S^1), passing back from the sides of the eye-discs, represent the tonic tension of the lateral muscles; and cords (I, I^1) drawing in the line of the interni, unite at the rear, and when pulled cause the eyes to converge.

If, now, the eye-discs are placed with their axial rays parallel, and the lateral rods of each parallel to the axial ray, they will represent emmetropic eyes with their visual axes parallel. Convergence of the eyes will increase the distance of the rotating cornea from the fixed points of attachment of the threads (t, t^1), and as the eye-axes converge to (P), the lateral rods will be drawn toward the axial rods, and all will meet at the same point as indicated by the dotted lines. The same holds for any other point along the median line (P, P^1), and the correspondence of each metre-lens of accommodation with its metre-angle of convergence will be manifest. If, again, the threads are slackened and the lateral rods are allowed to diverge, representing hypermetropic eyes, considerable convergence must be produced before they represent eyes focussed for parallel rays, and the excessive convergence becomes more marked as they are adjusted for a near-point. The production of convergent strabismus is thus made clear—more so if the entire excess of convergence is thrown upon one eye, as may be easily done. On the other hand, myopia, insufficiency of the interni, and other failures of equilibrium, may be as easily demonstrated in ways too evident to require detailed explication.

The apparatus being made to scale, any desired degree of error of refraction or convergence may be exactly represented.

The mechanical construction presents little difficulty, the rods being planed very thin anteriorly and bevelled at the edges so as to slide readily over each other. If hung upon the wall with the visual axes directed downward, gravitation exercises no disturbing influence and no weights are required to counterpoise the leverage of the long rods.

Having found it very useful, the writer can commend this model to those having need of anything of the kind, although it has received very little of the elaboration which will be suggested by its employment.

F. TERRIER (Paris). Electric Ophthalmia. *Archives d'Ophthalmologie*, Jan.—Feb. 1888., p. 1.

MAKLAKOFF (Moscow). The Influence of the Electric Light on the Integuments of the Human Body. *The Same*. March—April, 1889, p. 97.

In the first of the articles above named, the author summarises the published records of cases in which injury has been done to the eyes by the electric arc, used either for light-giving purposes or for the soldering of metals. This electric ophthalmia is sometimes slight and of very short duration, sometimes severe and very painful.

In the milder cases, discomfort or pain resembling that produced by a foreign body beneath the eye-lid begins a few hours after the exposure ; this increases, and may suffice to prevent sleep. The lids swell a little ; there is an increased flow of tears ; the conjunctiva is injected and sometimes œdematous, these latter changes being limited chiefly to the portion exposed in the aperture of the eye-lids. The pupil is sluggish, the fundus appears unchanged, there are subjective sensations of light and colour. These disturbances usually disappear completely in the course of three or four days.

In more severe cases the first symptom points to a retinal disturbance ; there is a scotoma, relative or absolute, covering the fixation point, and an appearance of supplementary colours. This soon passes away, but easily reappears when the patient opens and closes the eye-lids. After a few hours, as in the former case, pain begins together with injection and lacrymation ; this leads on to intense photophobia ; if the eye can be inspected, there is great injection of the conjunctiva, especially in the ciliary zone ; the pupil is contracted. In addition to the eye-troubles, there is often redness, swelling, and pain in the skin of the face, with fever and insomnia. These disturbances are severe while they last, but usually diminish at the end of twenty-four or forty-eight hours, leaving no permanent mischief. In one case, however (recorded by Little, O.R., vol. 2, p. 196), some impairment of vision, with haziness round the disc, persisted two months after the exposure.

With regard to the relative power for evil of the thermic, the luminous, and the chemical rays, the author quotes Charcot's opinion that it is the chemical rays which are chiefly potent, and calls attention to the proposal of Foucault, that the eyes should be protected by means of glass tinted with uranium, which has the property of intercepting the greater part of the chemical rays. He holds, however, that the question is not yet settled between the luminous and the chemical rays.

Maklakoff describes his personal experience of the effects of the arc light, as used in a large factory near Moscow for the purpose of soldering metals. Having been consulted as to the best means of protecting the workmen from injury by the electric light, he determined to test the matter in his own person. As used in this factory, the light is extremely intense. At one o'clock on a perfectly clear December day, the sun looked as dim, in comparison with the electric arc, as a gaslight usually does by the side of an ordinary electric lamp. The length of the arc is sometimes as great as 5 cm., and it is within a distance of one metre of the workman's face. The eyes are commonly protected by glasses of red and green, in combination, which are so impenetrable as to almost conceal the sun's disc. Severe effects are produced

upon the skin, and so great is the dislike of the workmen to it, that, although they receive a higher wage and are expected to work very short hours, they frequently relinquish this work for less highly paid and more toilsome occupations.

Standing near to the workmen, the writer directed his eyes to a point at one side of the light, and then turned them gradually towards it ; on attempting to fix it directly, the brilliancy of the light proved entirely unsupportable for more than a second or so. Turning away, there was for some minutes a well-marked absolute scotoma, and after that a yellow after-image indicating the track of the light across the retina during the movement of the eyes. The other effects are summarised by the author, as follows :—

“ Almost immediately after the exposure, the skin of the face and other exposed parts, and the eyes, begin to smart. Three or four hours later, coryza begins ; a little later still, a troublesome dry cough. These symptoms increase, and at the same time the skin becomes swollen and painful. About eight or ten hours from the beginning of the attack, the eyes become extremely painful, and remain so from four to six hours. The pains are of a cutting character, as though produced by sharp foreign bodies beneath the lid, and are aggravated by the slightest movements of the globe or the lids. There is free lacrymation, with photophobia, and chemosis of the bulbar conjunctiva. The skin becomes pigmented and very dry. During this period cocaine aggravates rather than relieves the pain in the eyes ; but the latter begins to diminish when the conjunctiva begins to secrete a muco-purulent discharge, and the pain in the skin diminishes when desquamation begins. From the sixth to the tenth day all acute symptoms have subsided, and there remains only a slight desquamation of the bronzed skin.”

Like previous writers, the author points out that these effects, which closely resemble the effects of scorching by the sun's rays, are not produced by heat, for the electric light is extremely poor in thermic rays. He ascribes them rather to the chemical than to the luminous rays.

At the conclusion of his paper, the author gives several drawings of the head-gear by which he proposes to protect

the face and neck of the workman. It consists of a frame carrying a plate of glass which, by a hinge arrangement, can be brought before the eyes or turned upwards at pleasure, and a yellow veil which, when required, completely screens the face and neck. The colour of the glass is not distinctly stated, but we gather that it is yellow, and that it is used together with the compound red and green spectacles ordinarily employed by the workmen.

P. S.

PICQUÉ (Paris). A Critical Study on the Pathological Anatomy and Pathogenesis of Optic Neuritis. *Archives d'Ophthal.* VIII., Nos. 5 and 6.

Pathological Anatomy.—The author begins by referring to Graefe's division of cases of optic-neuritis into those presenting ophthalmoscopic lesions of the papillæ and those characterised only by functional disturbances, and his further classification into those of central origin and those of peripheral origin. In the first of these latter sub-divisions Graefe included the cases which he considered due to increased intracranial pressure and the circulatory troubles consequent thereon. The second he reserved for all lesions of peripheral causation arising in the absence of any cerebral symptoms. Picqué holds that this is incorrect from a pathogenic point of view, and rests upon an anatomical error; this point he argues further on, but he retains the same classification throughout his article on account of its convenience, including, however, retrobulbar neuritis in the second group.

Neuritis of Central Origin.—The writer here draws a distinction between the intraocular expansion of the nerve fibres with the central retinal vessels and the retina proper, allowing, however, that a very intimate connection exists; thus functional integrity of the retina may be coincident with advanced changes in the expansion of the nerve fibres, and he expresses the opinion that some of the forms of retinitis should properly be classed under affections of the

optic nerve. Forster considered that several forms of retinitis were attributable to the condition of the choroid.

In the same way Picqué thinks that affections of the optic nerve should not be considered as limited by the papilla, as Graefe taught, except in certain conditions, which are described by him as ascending or descending optic neuritis according as the trunk of the nerve or its expansion on the retina is affected. In considering the changes that take place in the papilla, two stages are recognised, stasis and true papillitis. Stasis (*Stauungspapille*) is differentiated from general hyperæmia, by the fact that the venous dilatation only exists in the papillary region, the vessels regaining their normal size at the periphery of the fundus, and before disappearing through the lamina cribrosa, while in the other condition the venous distension is uniform; the most absolute point of difference, however, being swelling of the papilla, which occurs in a variable degree in the former, but never in the latter. It should be noted in this connection that stasis is not a distinct condition, but only the first stage of papillitis, and, therefore, as such, needs no separate description.

Papillitis.—This condition is characterised by œdema, vascular troubles, venous or arterial, swelling of the nerve fibres, infiltration of the tissue of the papilla, followed by the formation of connective tissue, which eventually by its contraction produces atrophy. All these changes are only present in the most marked cases. In the slighter forms, which may be considered as merely papillary stasis, there are no tissue changes, and all the signs may disappear after death. The above-mentioned symptoms all conduce to the swelling of the disc, the extent of which, however, by no means corresponds to the degree of the lesion. The œdema present is similar to that which may be found in inflammatory conditions of any other part of the body, and is not, as Graefe supposes, the cause of the inflammatory condition of the papilla. The theory that it is due to imbibition in dropsical conditions of the sheath of the optic nerve is very questionable, for no communication, so Picqué maintains, has been proved to exist between the lymphatic channels of the cranium and the disc.

Hypertrophy of the Nerve Fibre Layer.—The œdema

renders the nerve fibres distinguishable from each other and manifest to direct examination, producing the striated appearance one sees at the beginning of a papillitis, at the same time the adventitious coat of the vessels becomes infiltrated with lymphoid cells in the neighbourhood of the lamina cribrosa, and the swelling of the disc produces a manifest curvature in their course ; the nerve fibres then become the seat of a sclerosing hypertrophy, similar, according to Wecker, to the changes that take place in albuminuric retinitis. The fibres become varicose, presenting here and there swellings which have been variously described, but are in reality due to fatty degeneration, which takes place in this condition more rapidly than in albuminuric retinitis.

Tissue of the Papilla.—At the same time, or soon after the above changes, infiltration of the tissue proper of the disc takes place in varying degrees ; it may not, however, occur at all. As one would suppose, this infiltration increases the prominence of the papilla, but in some cases it cannot be distinguished from œdema, and Poncet holds that the conditions are histologically identical ; this observer further points out that the infiltration is not necessarily limited to the papilla, but can be observed accompanying the hypertrophy of the fibres of Muller. Ivanoff also describes a variety where the infiltration is limited to the peripheral parts of the papilla. Infiltration never goes on to suppuration in this connection, but to the formation of fibrous tissue, which destroys the nerve fibres by its contraction, producing white atrophy of the disc, in contradistinction to which should be noted the complete restitution that takes place in the slighter forms of papillitis when the tissue proper of the papilla is unaffected. Further, lymphoid infiltration is often accompanied by the appearance of fine vessels, either of new formation, or developed from the network of Haller ; the chief point to notice about them is that their walls very readily give way, producing hæmorrhages that may be so extensive as to mask the condition of papillitis.

The inflammatory infiltration is an irregular process, and gives the surface of the papilla an uneven appearance. The vessels follow the course of this swelling, and to direct examination appear to be made up of short, broken trunks,

the continuity of which has to be mentally recognised. This appearance, which is very typical of the condition, is due to one of two causes : either the different portions of the vessels are at different levels, and consequently cannot be brought into focus at the same time, or else portions of them are lost in the exudation.

Alterations of the Arteries.—This is again analogous to the condition found in albuminuric retinitis. In some cases the vessels are only affected at the edge of the papilla, producing what Ivanoff describes as peripapillary retinitis. The process is an endoarteritis, producing a thickening accompanied by a sclerosis of the internal coat ; this, like the obliterating arteritis of syphilis, affects usually the finest vessels and the capillaries. The affected vessel becomes a rigid tube, thickened and varicose, this latter condition being due to irregularities in the morbid process. Wecker propounds a theory that syphilitic and renal arteritis is due to infection conveyed by the perivascular sheaths of the vessels ; this, however, is far from being proved. It is not uncommon to find peripheral embolisms which do not necessarily give rise to hæmorrhagic infarcts ; the veins, too, sometimes becomes varicose and œdematous, presenting numerous hæmorrhages in their course which usually disappear without leaving traces of fatty degeneration.

Picqué now passes on to describe the affection of the intraocular expansion of the optic nerve—papillo-retinitis, as he calls it (the neuro-papillitis of Wecker). When the arteritis extends to the peripheral distribution of the retinal vessels, pathological changes take place in the retina as far as the ganglionic layer. The peripapillary œdema may detach the retina, and raise it to the level of the swollen papilla. Thus, a simple papillitis is converted into a papillo-retinitis ; the layer of visual cells of Muller remains intact, but the internal granular layer becomes involved, perhaps passively ; but it is an undeniable fact that the same lesions present themselves in the supporting tissue as exist in the nerve fibre layer. The analogy between these changes and those of albuminuric retinitis again presents itself, though the hæmorrhages commonly seen in papillo-retinitis do not leave behind the changes so characteristic of albuminuric

retinitis. There is doubtless a very intimate connection between papillitis and papillo-retinitis ; and Graefe, in considering them as two different conditions, the latter arising from a descending neuritis, based his theory on the erroneous supposition that there were always functional troubles present, and a compression of the cavernous sinus. This second point Picqué refers to further on. It is true that the atrophy of the nerve fibres which takes place is due to a compression, but it is a compression that is furnished by the lymphoid infiltration of the papilla, and the invasion of the fibres by connective tissue formation, under which double influence the nerve fibres disappear from the papilla, and are transformed into bands of connective tissue. These changes are proportionally more marked the longer the inflammatory condition has been maintained. The papilla may remain swollen for a long time ; but directly the swelling begins to disappear, white atrophy presents itself, and continues to increase as the result of cicatricial contraction.

Ophthalmoscopic Aspect of Papillitis.—The features that present themselves are the following : A narrowing of the arteries—not produced by compression of their calibre, as Graefe supposed, for pressure on the globe easily produces arterial pulsation ; a tortuous condition of the veins ; blurring of the margins of the disc ; then there soon arises the valuable sign of swelling of the disc, and the peculiar striation ; next, the disc loses its outline and transparency, and assumes a greyish tint, in which the points of emergence of the vessels are concealed, as is also the early striation, which, however, reappears later on in the stage of atrophy. As regards the vessels, there should be mentioned the apparent interruptions in their course, and the fact that at the periphery they again assume their normal calibre—a fact which, combined with the above-mentioned pulsation on pressure of the globe, clearly refutes Graefe's theory of strangulation at the level of the papilla. Later on, ophthalmoscopic signs of arteritis appear, white bands accompanying the vessels to a variable distance beyond the limits of the papilla, mingled with sclerosed fibres and foci of degeneration, less frequently seen, however, than in

albuminuric retinitis. These changes attain their maximum in papillo-retinitis, which fact, combined with the lesser projection of the papilla in that condition, helps to a differential diagnosis between the two diseases.

R. W. DOYNE.

(*To be continued.*)

Haab (Zurich). Diseases of the Macula Lutea.
Bericht ueber d. Ophthal. Congress. Heidelberg, 1888.

The author in this paper does not deal with the well-known forms of disease of the macular region, such as occur in connection with myopia, kidney disease, diabetes, neuritis from cerebral tumour, etc., but with some rarer conditions which are of importance in consequence of the serious defect of sight to which they give rise. The cases to which attention is directed are grouped as follows:—(a) Cases due to contusion of the eye-ball, usually without, occasionally with, laceration of the sclera; the blow may be from in front of or behind the eye-ball. In the less severe cases there results a very transient retinal disturbance (*trübung*) limited to the macular region, followed by complete recovery. When a more severe injury has been received, the macular affection is often accompanied by slight retinal changes in the peripheral part. The author holds that (excluding the macula) the greatest change in the retina occurs in that portion corresponding to the site of impact of the missile, and does not believe that injury to this tunic occurs by *contre-coup*. Given a certain amount of retinal disorder (short of detachment), as the result of a blow upon the eye, the macular region will, in consequence of a greater vulnerability, suffer in a greater degree than the other parts of the retina.

(b) Cases in which a foreign body (usually a metal chip) has lodged in the vitreous, without actual wound of retina. Here the macula may suffer though all other parts of the retina remain healthy, and although the chip may be situated in the anterior part of the vitreous body. Any mechanical or chemical effect of a foreign body should be

felt by all parts of the retina equidistant from it, were there not a greater susceptibility of this particular part.

(c) Cases in which disease of the macula occurs secondarily to choroidal rupture or choroidal hæmorrhage in its neighbourhood; and cases of protrusion of the eye-ball from tumour or phlegmon of orbit, in which fine changes are found in the y.s. region, all other parts of the retina remaining healthy.

(d) Senile macular disease, by no means uncommon, and often vitiating the otherwise successful result of operations for cataract. It is usually bilateral, and should always be carefully searched for in cataract cases before the lenses become too opaque.

(e) A small group of cases, in which macular disease is found in patients weakened by long-continued gastric disorder, anæmia, etc. The author suggests that an hereditary predisposition to disease of the macula may exist in such cases, the anæmia or other illness being merely the exciting cause.

Haab thinks that in the above groups of cases, as well as in myopia, diabetes, kidney disease, etc., the greater vulnerability of the macular region accounts for it being the seat of election of changes resulting from defective nutrition and disturbed vascular conditions, which the other parts of the retina are able to withstand. Regarding this greater vulnerability, he suggests that it is not entirely due to the complex anatomical structure and peculiar (retinal) blood supply, but also to the constant functional activity of this part of the retina, and the great demands which are thus made upon it. There are many other examples in the organs of man of excessive function favouring disease—*e.g.*, carcinoma of stomach and uterus, ovarian disease, emphysema of lungs. This localised retinal disease may be compared to localised disease in the cerebro-spinal system—as, for example, in cases where the posterior columns of the cord are alone affected, the rest of the cord remaining healthy, or where optic atrophy comes on, all the other cranial nerves being unaffected.

J. B. L.

SCHÖSL (Prague). Primary Purulent Retinitis.
Centralbl. f. prakt. Augenheilk. Mar., 1889.

The author introduces his article by remarking that purulent retinitis belongs altogether to the literature of recent years, and is but little known. The possibility of such a disease has been disputed on the ground that there are no elements in the retina from which this condition could develop.

The first observation on purulent inflammation of the retina was made in 1856 by Virchow, who, shortly after the appearance of his work on "Embolism of Large Arteries," found numerous emboli in small arteries and capillaries in the eye of a patient dead from nephritis, and as a result purulent inflammation of the choroid, ciliary body, and retina. Virchow thought the case was one of metastatic retinitis with co-incident inflammation of the uveal tract, but it has been suggested that the retina became affected secondarily from the choroid. In 1860 Nagel published a very similar case of purulent embolic retinitis after operation upon a degenerate cystoid thyroid gland. In the same year Graefe and Schweigger recorded a case of purulent retinitis in an eye affected by panophthalmitis following corneal inflammation. A year later Ritter published the results of his experiments on rabbits, and questioned, not only the accuracy of previously reported cases of purulent retinitis, but also the possibility of such a condition. In 1863 Schiess undertook similar experiments, and concluded that purulent inflammation of retina was invariably the result of infection by, or extension from, the choroid. Knapp, in 1867, recorded three cases of metastatic embolic inflammation of choroid occurring in the puerperal state, in which the retina became secondarily affected. In the same and the following year, Berlin made some important and interesting observations on traumatic purulent inflammation of retina, occurring in eyes containing foreign bodies. He concluded that the condition was one of genuine purulent retinitis, mainly on the ground that he found pus cells only in the nerve fibre layer of the retina, the deeper layers nearer the choroid being free, and that

there was pus in the retina in parts where the underlying choroid was quite normal. In 1874 Heiberg published a case in which he found numerous retinal emboli after puerperal endocarditis and a purulent layer covering the inner surface of the retina. In 1880 Hirschberg made some observations on puerperal septic embolism of the eyes, giving details of a case which he had examined during life, and in which he found, *post mortem*, purulent infiltration of the optic papilla and the retina, the latter being much thickened, while the subjacent choroid was practically unaffected.

Schöbl has found no more recent writings on this subject, and in analysing recorded cases divides them into three groups :—(1) the majority are metastatic in nature, and complicated with analogous affection of other parts of the eye ; (2) the retinitis is part of panophthalmitis of varying origin ; (3) traumatic cases resulting from foreign bodies in the eye.

Of the cases of primary purulent retinitis observed by himself, two groups are formed :—(1) acute traumatic inflammation caused by a foreign body in the vitreous chamber ; and (2) chronic retinitis, which has hitherto passed clinically as chronic purulent choroiditis. In his first group he gives three cases, in all of which a fragment of a percussion cap entered the eye through the centre of the cornea and passed through the lens into the vitreous without wounding the iris. The chip was found, in all three eyes, at the lower part of the vitreous, and in no one case was there proof of wound of retina or choroid. He gives full details of only one of the three cases, as the other two were very similar. A boy, *æt.* 8, received a wound of the left eye from the explosion of a percussion cap. Schöbl saw him the same day, and found a linear wound 1·5 mm. long in the centre of the cornea. There was a visible rent in the anterior capsule of the lens, no wound of iris. The vitreous was hazy, chiefly in the lower part ; vision was reduced to counting fingers at one metre. By the third day there was chemosis, slight exophthalmos with limitation of ocular movements, and a yellowish reflex from the vitreous. The eyeball was removed next day and carefully hardened. When examined some time later, there was found much pus in the vitreous, great thickening

of the retina, and a chip of metal lying in the lower part of the vitreous. On microscopic examination the choroid in its whole extent appeared quite normal ; the retina, on the contrary, was much thickened, the increase being greatest in the neighbourhood of the papilla, and gradually lessening from this point to the ora serrata. Between the retina and choroid was a layer of pus and fibrin varying from 0·25 mm. to 1·0 mm. in thickness, and a similar but thicker layer lined the inner surface of the retina as far as the pars ciliaris, on which portion was a layer composed of young round cells exhibiting all stages of karyo-kinesis. The most noticeable change in the retina itself was in the nerve fibre layer, which was greatly thickened, and its blood vessels dilated and engorged : there was also infiltration, with round cells, especially about the vessels, but extending thence to both the inner and outer surfaces of the tunic. The papilla too was infiltrated, but the cells did not extend along the optic nerve. The hyaloid, especially in the posterior and nasal part, was detached from the retina, and between the two was the layer previously referred to. The vitreous showed throughout large numbers of young lymphoid cells with nuclei undergoing fission. The lens was displaced forwards, its anterior and posterior capsule ruptured, and the track of the foreign body through the lens was occupied by small round cells. The iris was infiltrated with similar cells.

In the second case the eye was enucleated on the tenth day. The pathological appearances were almost identical with those just described, but the choroid exhibited slight thickening and round cell infiltration.

In the third case the globe was removed on the twelfth day after the accident. The conditions found on examination were like those in case 1, the choroid being unaffected.

In the above three specimens, the most noticeable change was undoubtedly that in the retina ; this membrane in its whole extent being the seat of suppurative inflammation, and from it the author thinks the purulent layers which lined its internal and external surfaces were derived. In cases 1 and 3 he considers that the nerve fibre layer was the chief source of the inflammatory products. The suppuration in the vitreous he believes to have been secondary to that in the

retina, and he goes on to state that in his opinion a foreign body which has entered the eye without wounding the iris sets up inflammation of that portion of the retina against which it rests, and that the products of this retinitis infect the vitreous, the choroid escaping. In cases in which, on the contrary, the foreign body passes through the iris or choroid, a purulent choroiditis is set up, and the other structures become subsequently involved.

In the second group the author reports two cases in which he found purulent retinitis in eyes which had not been wounded, and states that he has been unable to find any similar records. His first case occurred in a healthy six-year-old female child. For nine months the parents had noticed an unusual reflex in the right eye, and for about six months the eye had been blind. Three weeks before Schöbl saw the child, the eye became red and painful. On admission the following conditions presented:—The eyeball was slightly enlarged and prominent, and its movements limited; there was much pericorneal injection, the cornea was cloudy, A. C. shallow, iris atrophied and motionless; lens partially opaque; yellowish-white reflex from the vitreous; T + 2; no p. l. The eye was removed, and examined after hardening. The choroid showed no inflammatory changes, but in its whole extent was thinned and atrophic, as were also the ciliary body and iris. The retina, on the contrary, was replaced by a thick purulent membrane exhibiting here and there remnants of its vessels. Only the ciliary part of the retina preserved its distinctive characters, and covering it was a layer of small cells. The optic disc was excavated, and extending into the nerve between the atrophied bundles of fibres were columns of round cells continuous with the cell mass which filled the cup. The lens was displaced forwards, the zonule greatly stretched. There were no inflammatory products in the cornea.

The second case, which was very similar, was that of a child between two and three years of age, who had become blind in one eye several months previously, without any external signs of disease. The eye was not congested; the dioptric media were clear, but a whitish-yellow reflex came from the vitreous. A diagnosis of probable glioma was made

and the eye enucleated. On opening the eyeball the anatomical conditions were almost identical with those of the former case, and need not be described.

In discussing these two cases, Schöbl expresses the opinion that a correct diagnosis was hardly to be expected, at least in the knowledge which he then possessed. He believes that they were instances of genuine purulent retinitis, and that the greater part, if not the whole, of the purulent material found in the eyeballs was derived from the retina. The suppuration in the vitreous he looks upon as secondary to that in the retina ; certainly it did not owe its origin to any portion of the uveal tract. It is unlikely that these cases were metastatic in nature ; there was no general or other local disease present, and it is most probable that if of this character, the choroid would also have suffered. The normal condition of the optic nerve sheath and intervaginal space excludes the possibility of explaining the condition by an extension of inflammation from the subdural space, but the author is inclined to think that the inflammation may have spread from the basis cranii along the optic nerves themselves. He concludes by remarking that cases of chronic purulent retinitis are probably not so rare as the scanty records would lead us to suppose, and that many of the cases of so-called purulent choroiditis are in reality cases of primary purulent retinitis ; he adds that the diagnosis between these two diseases, *intra vitum*, is very difficult, if, indeed possible.

J. B. L.

ARNAUTS (Liège). The Treatment of Granular Conjunctivitis by Corrosive Sublimate. *Annales d'Oculistique*. Jan.—Feb., 1889.

The writer, in a short paper, gives some records of the results obtained in the treatment of trachoma, by corrosive sublimate, at the clinique of Dr. Romiée, during three years. His experience is strongly in favour of this remedy, in preference to the more commonly used nitrate of silver,

sulphate of copper, and other caustics and astringents. He is especially pleased with its effect in old chronic cases, with severe pannus; and states that the disappearance of the corneal vascularity is so rapid that it suggests some special action of the sublimate on the newly-formed vessels.

The following is the method employed. The patients are seen, if possible, twice a week, and at each visit, after instillation of a few drops of a 5 per cent. solution of cocaine, the conjunctival surface of the lids is brushed with a solution of corrosive sublimate, $\frac{1}{100}$ or $\frac{1}{1000}$. In addition, collyria of the same salt are given, of the strength of $\frac{1}{100}$ or $\frac{1}{1000}$, which the patients are directed to drop into the conjunctival sac three times daily. These drops give rise to some irritation and conjunctival injection, which is said to pass off in a few minutes. In sensitive patients, a weak solution of cocaine may be previously applied.

In the "Recueil d'Ophtalmologie" of Feb. 1888, Staderini, writing on this subject, gave a very favourable account of his experience of the use of corrosive sublimate, stating that the results obtained by its employment in all stages of granular conjunctivitis were very satisfactory. He suggested that its action was that of an antiseptic, and a solvent of the lymphoid infiltration in the submucous tissue. If the microbe described by Sattler, Poncet, and others, be the chief or sole cause of trachomatous conjunctivitis, corrosive sublimate should prove of great efficacy in the treatment.

Arnauts gives short notes of ten cases in which the treatment he advocates was employed, and in which rapid improvement, and sometimes complete recovery ensued; of these ten we may copy the following case:—A coal miner, æt. 26, came under observation Oct. 26th, having had previous treatment by sulphate of copper. Right upper lid thickened and drooping; much photophobia; very severe papillary hyperplasia of the palpebral conjunctiva, with large pale granulations; dense pannus covering almost the whole cornea, and a central ulcer. Ordered solution of corrosive sublimate, $\frac{1}{100}$ to be used three times daily; the lid was cauterised twice a week with the stronger solution.

By Nov. 3rd a very marked improvement was evident, both in the lids and cornea. On Nov. 20th, vessels had disappeared from the cornea, and the conjunctival surface of the lid was much less granular. By Dec. 18th, the conjunctiva of the upper lid was smooth, the thickening and ptosis had disappeared. Some greyish infiltration of the central and upper part of the cornea remained. Vision was greatly improved. The bi-weekly cauterisations were now omitted, presumably the daily applications were continued.

J. B. L.

STÖLTING (Hannover). Extraction of an Encapsuled Cysticercus from the Eye. *Arch. f. Ophth. Bd. XXXIV., Abtheil. 4.*

The case here recorded was one in which the diagnosis of subretinal cysticercus was made by ophthalmoscopic examination and the parasite removed by operation, with, however, loss of sight from detachment of retina. The patient, a soldier, æt. 20, complained of defect of sight in his right eye. No pain or irritation. V=counting fingers at 1·5 mm., with eccentric fixation. The ophthalmoscope revealed the following changes:—A few small opacities in the vitreous; other media clear. At the posterior pole of the eye, up and out from the papilla, was a cyst, with its long diameter horizontal. On its anterior surface was an apparent constriction, which divided it into two nearly equal parts. The colour was yellowish white, except a small portion up and out, which was very white, and reflected light; and on this part no vessels were visible, though over the remainder of the cyst they were numerous. In consequence of the overhanging margins of the cyst, it was impossible to determine whether or no the vessels were continuous with the retinal vessels. Upwards and outwards from the cyst, about two mm. distant, was a triangular scar in the choroid, nearly as large as the cyst itself.

Undulatory movements had been observed by Bentzler, under whose care the patient was at first.

In the course of a few weeks the cyst had increased a little in size, and its position beneath the retina was more evident. An attempt to remove it was made ; the external rectus was divided, and the sclera incised over the situation of the cysticercus, and a sharp hook introduced with which to pull out the cyst, without success, however. Vitreous escaping, the wound was closed. Eight days later Stölting found, on examination, that his incision was about one mm. above the cyst, the appearance of which was unchanged. The eye could still count fingers at one metre.

Four weeks later a second operation was undertaken. On this occasion forceps were introduced through the opening in the sclerotic, the cyst seized by them and withdrawn ; it was so firmly embedded that considerable traction was necessary to dislodge it, and its walls gave way during the removal. The wound healed kindly, but total detachment of retina ensued, and hæmorrhage into the vitreous. Microscopic examination proved the correctness of the diagnosis, and also that the position of the cyst between the retina and choroid had been accurately determined. Two months after the second operation the eye was quiet, with normal tension ; movements full, no divergence.

J. B. L.

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NOTE ON THE ORIGIN OF PTERYGIUM AND ULCERS OF THE CORNEA.

BY C. J. BOND, F.R.C.S.,
HON. SURGEON TO THE LEICESTER INFIRMARY.

Though various theories have been put forward to explain the origin of pterygium, its ætiology or pathological history is at present not fully known.

If the ocular conjunctiva be observed in many elderly people, and in some adults past middle age, in whom there is a certain amount of looseness and want of elasticity in the subconjunctival areolar tissue, it will be noticed that as the lids are closed the conjunctiva is puckered up and thrown into transverse folds on either side of the cornea, along a horizontal line which corresponds with the line of junction of the closed lids, running from the cornea to the inner and outer canthus respectively.

Though this folding or puckering does not occur to any extent in the young and vigorous, in whom the conjunctiva more closely envelopes the globe, yet even in these there are frequently more vessels along this line, and often a peculiar yellow tinge due to proliferation of the subconjunctival tissue.

Now, the bearing of these remarks is obvious. The points on the inner and outer corneal edge to which these puckered lines run, are exactly the points at which pterygium is most commonly found, in fact, it rarely occurs away from these points; and it seems highly probable that, starting with some irritant, such as the sand or flies of eastern countries in which pterygium is so

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common, or the dust or foreign particles connected with some work or trade, an excessively frequent momentary closure of the lids occurs, leading to constant irritation of the conjunctiva along these lines, and altered vascular conditions ; then comes the abrasion, or removal by ulceration of the epithelium at the margin of the cornea and overgrowth of the irritated conjunctival tissues upon the abraded portion. While thus producing pterygium in extreme cases, it seems also very probable that this mechanical irritation of the conjunctiva at the inner and outer margin of the cornea will also have considerable influence in causing or in perpetuating marginal ulceration of the cornea ; and it is, moreover, extremely suggestive that, so far as I know, animals such as dogs, sheep, etc., in whom the cleansing of the cornea is carried out by the horizontally moving third eyelid seem to be wonderfully free from pterygium and corneal ulcer. On this point, however, we need the opinion of those experienced in such cases.

As regards the bearing of these remarks on the treatment of these conditions, it is at once evident that the only way to keep the parts at rest is to keep the eye either constantly open, which is impossible, or constantly closed ; and hence the value of closing the eye by bandage, and the benefit derived from division of some of the fibres of the orbicularis is, perhaps, partly owing to the rest thus given to the conjunctiva by paralysing the lid spasm.

NOTE ON A MODIFICATION OF MR.
PRIESTLEY SMITH'S METHOD OF
MOUNTING EYE SPECIMENS.

BY T. H. OPENSHAW, M.S., F.R.C.S.,
CURATOR OF THE PATHOLOGICAL MUSEUM OF THE LONDON HOSPITAL.

The weak point in Mr. Priestley Smith's method (*Ophth. Review*, vol. ii., p. 69) seems to be that the glycerine jelly, in consequence of the specimens not being hermetically sealed, not only decomposes and often assumes a reddish-brown colour, but liquefies at a certain temperature and evaporates.

To obviate this tendency to decomposition, I carbolize the jelly by the addition of one drachm of a 10 p.c. solution of carbolic acid to each 6 oz. bottle of jelly, warmed and liquefied; no more than one drachm should be used, or the jelly becomes opaque, which opacity may only appear when the specimen is mounted and the jelly is becoming cold. The best method of sealing is that adopted for all wet pathological museum specimens, and for this purpose the edge of the cup must be roughened.

Having cleaned the glass cup, filled it with carbolized jelly, placed the specimen therein, freed it from air bubbles, and turned it over so that the surface to be shown rests against the bottom of the cup, holding the specimen in position with a needle I pour away some of the jelly, leaving just sufficient to cover the specimen. The jelly, which is yet tepid and fluid, is then allowed to cool and solidify.

When the jelly has become just sufficiently firm to support it, a disc of white enamel glass (cut to fit loosely the interior of the cup) is carefully dropped flat upon the surface of the jelly.

This disc forms a clear white background, and by contrast renders the details of the specimen more distinct ; and, being placed close to the specimen, it is less likely to become concealed by discoloration of the jelly than if placed at the back of the cup.

The specimen cup is then allowed to stand until the jelly is quite solid, and is then filled with jelly and again allowed to stand.

When quite set, a cover of common glass cut to fit accurately the top of the specimen cup is then fastened down with black cement—a mixture of gutta-percha, four parts, and pitch, one part.

To the specimen so mounted, access of air is impossible. In this way, therefore, and by the addition of carbolic acid, or some other antiseptic, decomposition of the specimen and discolouration of the jelly may, I think, be prevented, and the specimen preserved permanently.

Moreover, the black cement is seen through the walls of the cup, and gives the specimen the finished appearance of being surrounded by a dark, circular border.

A SIMPLE IMPROVEMENT FOR SPECIMENS OF EYES MOUNTED FOR MACROSCOPICAL EXAMINATION.

BY TREACHER COLLINS,
CURATOR OF THE MUSEUM, ROYAL LONDON OPHTHALMIC HOSPITAL,
MOORFIELDS.

The use of glycerine jelly, originally suggested by Nettleship* as a medium for mounting specimens of eyes for macroscopical examination, has now become almost universal. The methods of preparing both the eyes and the jelly have been greatly improved and

* Royal London Ophthalmic Hospital Reports, vol. VII., p. 225.

described by Priestly Smith.* Still, in the most successful preparations mounted in this way, on account of the smallness of the parts concerned, the most interesting features of the specimens are often inconspicuous ; such, for instance, as the blocking of the angle of an anterior chamber. No doubt this may be overcome by looking at the specimen under a low power of the microscope ; but when specimens are placed in a museum this is often impracticable.

With the view of partly overcoming this difficulty I have adopted the following procedure, which, besides magnifying the specimens, adds considerably to their general effectiveness.

To the top of the glass jar in which the specimen is to be mounted I cement, by means of Canada balsam dissolved in chloroform, a plano-convex lens of the same diameter as the jar, and of a focal length of an inch and a-half. On first placing the lens on the jar, unless the surface on which it rests is absolutely level, it has a great tendency to slide to one side ; I therefore for the first 24 hours place the jars on a levelling stand, and then bake them in an oven for some hours, after which there is no fear of the lens becoming displaced, and the specimen may be mounted in them in the usual manner.

In this way an enlarged virtual image of the specimen is shown, and many of the details become more pronounced. Instructive macroscopical specimens may also be prepared by cutting a thick section of an eye-ball with the ether freezing microtome, about four times the thickness of an ordinary section, passing it through the different strengths of glycerine and water, and then laying it on a disc of what is known as 'opal glass, pouring a little glycerine jelly over it, and finally, laying gently on the top a plano-

* Ophthalmic Review, vol. II., p. 68.

Report of International Ophthalmological Congress, 1888, p. 413.

convex lens, taking care to exclude all air bubbles, much in the same way as one lays a cover-glass on to a microscopical specimen.

The discs of opal glass, which are really quite white, form a very suitable background. Both they and the plano-convex lenses are made for me by Mr. Hawes, 79, Leadenhall Street, E. C.

R. L. RANDOLPH (Baltimore). Sympathetic Ophthalmia: an experimental study. *Archives of Ophthalmology*, June, 1888, p. 188.

Randolph seems to come forward as a supporter of the "ciliary nerve" theory of sympathetic inflammation, which assumes the production of inflammation by reflex action, but it is not possible to be certain as to his exact opinions. The paper contains a brief account of the various theories which have been advanced, and describes Deutschmann's experiment with aspergillus spores and staphylococcus pyogenes. The latter experiments have been repeated by Randolph on dogs. In all, fifteen experiments were made. In nine of these the inoculated eye-ball ruptured and its contents were disgorged. In the other six cyclitis and iridochoroiditis developed, and the end was phthisis bulbi. The dogs were killed at intervals of from three weeks to four and a half months after the operation. In only one case was anything like a constitutional result produced. This was an interstitial keratitis of the second eye, which Randolph believes had no connection with the inoculation whatsoever. In all the other cases no disease was to be found, ophthalmoscopically or microscopically, in the second eye.

Randolph has also repeated Deutschmann's experiments of inoculating staphylococcus aureus in rabbits. The first rabbit died in forty-eight hours with all the symptoms of general infection; the second in ten days with evidences of brain trouble. Five rabbits were killed by accident within

fourteen days of the operation—the second eyes being normal. Eight rabbits were killed in from one to two months after inoculation (one of these, however, was killed in fourteen days). In none of these did the second eye reveal any evidence of sympathy, ophthalmoscopically or microscopically. In this connection Randolph calls attention to the difficulty in recognising a true inflammation in the optic nerves and chiasma of dogs and rabbits, the normal nerves and chiasma exhibiting such an amount of nuclei that mistakes can easily be made, more especially as the nuclei decrease towards the chiasma and increase towards the globe in normal nerves. He does not assert that Deutschmann has actually made the mistake, but this inference is obvious.

As regards the ophthalmoscopic signs of inflammation which Deutschmann found in the second eye, Randolph attributes it to the general infection of the animals. They all died of general infection, which means that heart, kidneys, etc., were all infected, and retinitis is a perfectly natural product of such a condition.

Randolph has failed to find microbes in one eye enucleated during an attack of sympathetic ophthalmitis, and in two eyes enucleated merely as a measure of precaution. Cultivations from these eyes also proved unproductive. He seems to attribute this absence of microbes from the cultivations to the careful antiseptic precautions he took to avoid impurities, and regards it as possible that in Deutschmann's similar cultivations the micrococci came from some source other than the enucleated eye.

The absence of general infection in his cases he regards as due to the good food and ventilation his animals received, and the small quantity of cocci injected.

Randolph concludes that, while as a clinical observer he is inclined to believe that infection does play a roll in the production of sympathetic inflammation, he seriously doubts that the optic nerve forms the tract by which the morbid process travels, and does not feel justified from his experiments in drawing a positive conclusion as to the genesis of sympathetic ophthalmitis.

From a comparison of the above papers with Deutsch-

mann's monograph (*vide* O. R. vol. 8, p. 111), it seems that the state of the case at present is as follows: True so-called malignant sympathetic ophthalmitis as it occurs in man has not been experimentally produced in other animals, for the cases upon which Deutschmann relies may conceivably be cases of neuro-retinitis from general infection, but an inflammation has been made to extend up the nerve sheaths from one eye to the chiasma and down the sheaths of the second nerve, which inflammation must be regarded as of a sympathetic nature. It is absurd to suppose that a man of Deutschmann's experience cannot distinguish between a normal nerve and an inflamed one in rabbits. It may also be regarded as demonstrated that the human eyes which excite sympathetic inflammation contain pathological organisms—indeed, it would be very remarkable if they did not—and the presence of micrococci in the sympathising eye must also be admitted. Deutschmann states that he has seen them first and cultivated them afterwards; and though the cultivations may, as Randolph hints, have been contaminated from other sources, the original observation remains valid. Micro-organisms existed. The fact that another observer failed to find them or cultivate them in somewhat similar cases proves nothing against the soundness of Deutschmann's observations. It is highly probable that the path followed by the micro-organisms is the optic nerve sheath, but until a sympathetic inflammation of the true malignant type has been produced without co-existing general infection, and the parts have been microscopically examined, the actual route cannot be held to be demonstrated.

J. B. S.

C. HESS (Prague). Experiments on the supposed Power of Unsymmetrical Accommodation, in Emmetropes and Anisometropes. *Von Graefe's Archives*, Vol. 35, Part 1, p. 157.

In a recent article on this subject by A. E. Fick, certain observations are described which, according to their author, prove the possibility of unequal accommodation in the two eyes simultaneously, and thereby refute the results arrived at by Donders, Hering, and others. The present paper is a criticism of Fick's experiments.

The question is whether, during binocular vision, eyes which have unequal refraction, or which are rendered unequal by the use of a lens, can obtain, simultaneously, perfect definition of the object looked at. Fick experimented in the following way. Two exactly similar pieces of small print are arranged side by side, so that when viewed by the two eyes respectively they formed a single stereoscopic picture. In the one, certain words are obliterated by pasting white paper over them; in the other, certain other words are treated in the same way. In the binocular picture each of the gaps thus formed is filled by the monocular picture of the corresponding word, and if both eyes be correctly focussed the whole is distinctly seen; but if either eye is incorrectly focussed the words seen by that eye only will be more or less blurred as compared with the adjacent words. The point to be determined is whether, and to what extent, a difference of refraction in the two eyes is compatible with legibility of the print. The refraction of the two eyes may differ by 2 or even 3 D, and yet the whole of the words remain legible. Is a portion of this difference neutralised by unequal accommodation, or can the legibility of the type be explained in some other way?

Fick found that while a difference of 1.5 D blurred the monocular words at the first trial, a difference of 3.25 D was overcome in one case after several weeks' practice. Hess points out that the phenomenon of contest between the two fields—between the printed word in the one case and

the blank space in the other—must here be taken into account, and will largely explain the improvement obtainable by practice. He points out also that the amount of the refractive error which is compatible with legibility varies greatly with the size of the type employed, and that it is important to use very small type presenting unfamiliar words and to change it at different trials. By similar experiments of his own, upon colleagues experienced in such observations, he found that on using very small type (J No. 1) placed at a distance of 50 cm., the greatest refraction difference compatible with legibility was 0.5 D, and by further experiment he was able to prove that the type was legible *in spite of* this difference, and not through its neutralisation. Across each paper he stretched a filament of cocoon silk, so that when the eyes were focussed properly the filaments were seen lying close together; a refraction difference of 0.5 D invariably caused one or other thread to disappear though the type remained easily legible to both eyes; a glass of 0.25 D before either eye invariably blurred the corresponding thread and sometimes caused it to disappear entirely. This proved that even so slight a difference as 0.25 D was not neutralised by the accommodation.

Hess points out also that the size of the pupil has much influence on the legibility of the type, and that in experiments of the kind in question slight contractions of the pupil may simulate the effect of accommodative changes. Thus when a myopic eye fixes an object lying beyond its far point, the retinal picture may be actually improved by an accommodative effort, because the contraction of the pupil diminishes the circles of diffusion more than the added refractive error increases them.

Finally Hess tested, with regard to the possibility of unequal accommodative effort, a series of anisometropes, choosing for the purpose professional colleagues in whom the difference between the two eyes was small. In such persons, if in any, the faculty should be met with, for the error to be corrected is small, and the need for correction is constantly present. Having rendered the refraction of the two eyes absolutely equal by means of a glass, he ascertained

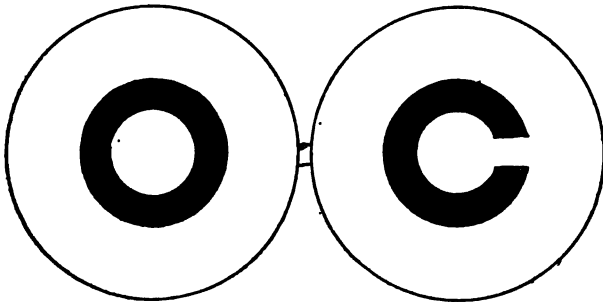
by trial whether perfect binocular definition could still be obtained when this equality was in any degree disturbed. As before, the legibility of the test words was found to depend on the size of the type, and the filament of silk could not be defined by both eyes simultaneously even when the eyes differed only by 0.5 D.

There is therefore no reason to doubt the teaching of the older authorities, which maintains that an unsymmetrical accommodative effort is impossible—a point of much practical importance in the treatment of refractive errors.

P. S.

E. LANDOLT (Paris). Simple Test-types. *Doin. Paris.*

This simple test apparatus is shown in the adjoining illustration. It is intended for use in cases in which the acuteness of vision is less than 1-10th, and as a substitute for the too primitive method of counting the fingers. It is based upon Snellen's principle, according to which the acuteness of vision is normal, if the eye distinguishes separately two points under an angle of one minute.



It consists of two figures, one a complete circle, the other a circle broken by a white space. The edges of this space appear under an angle of one minute when the object is

placed at a distance of 50 mètres ; the figures thus correspond to number 50 of Snellen's scale. If the **C** is distinguished from the **O** at five mètres only, V equals $\frac{1}{5}$, and so forth. To test the accuracy of the patient's answers, it is well to vary the position of the figure **C** and to ask him to indicate the side on which the circle is broken.

P. S.

WIDMARK (Stockholm). **The Influence of Light on the Anterior Parts of the Eye.** *Transactions of the Biological Society of Stockholm, Oct., 1888.*

The Influence of Light on the Skin. *The Same, March, 1889.*

The recent observations of Terrier, Maklakoff, and others (see *O. R.*, May, 1889), concerning the effects produced by the electric light upon the eye and skin gave no absolute proof as to whether these effects are due to the chemical or to the luminous rays. Widmark has made further experiments and obtained conclusive results.

He found that when the eye of a rabbit is exposed, with widely separated lids, to direct sunlight, or to the electric arc light of 1,200 candle-power at a distance of 25 cm., an ophthalmia resembling the so-called snow-blindness is produced. The conjunctiva in the exposed area swells and reddens ; the pupil contracts ; the colour of the iris is slightly altered ; the corneal epithelium desquamates ; and there is a secretion from the conjunctiva. These changes were formerly attributed to the excessive dazzling of the retina. Berlin, Terrier, and others have shown, however, that they are produced by the direct influence of light on the affected parts. This is completely confirmed by Widmark. When a screen having a round aperture 2.5mm. diameter was placed before the eye of the rabbit, so that the light fell only on the pupil and not on the rest of the eye, no irritation beyond a slight corneal haze corresponding with the pupillary area was produced. On the other hand, when the pupil was screened and the rest of the eye exposed the usual effects were produced.

In order to test the action of the different kind of rays, a hollow lens filled with a saturated solution of alum was placed at its own focal distance from the arc light. By this means a parallel pencil, deprived of its ultra-violet and ultra-red rays, but of increased luminous intensity, was obtained. This pencil produced no effect upon the front of the eye. The usual results, therefore, cannot depend upon the luminous rays. Further experiments, controlled by the thermometer, proved that the irritation of the eye occurs in the absence of heat rays.

Rock crystal and glass are nearly alike in their power of transmitting light rays and heat rays, while they differ greatly in regard to chemical rays, the crystal permitting them to pass, the glass absorbing them. Utilising this difference in his experiments, Widmark was able to demonstrate the dependence of the ophthalmia on the chemical rays.

The irritation of the conjunctiva and cornea is due, therefore, to the direct action of light, and chiefly of the chemical rays, upon these tissues. The irritation of the iris appears to be caused in the same way, for when this membrane is protected it suffers no change, although the retina be exposed. It is probable, the author thinks, that the parts which underlie the exposed conjunctiva become injected by reason of their contiguity to it.

The second paper describes similar experiments relating to the action of light on the skin. The animals employed were albino rabbits, a sufficient area of the skin being carefully shaved. Rock crystal and glass were utilised in the same way as before. By means of a lens of crystal—which does not absorb the chemical rays—a parallel pencil of light was made to impinge on the skin, but before reaching the skin it was caused to pass through a disc of glass in the centre of which was a hole filled with a small disc of rock crystal. By this means the outer zone of the pencil was deprived of its chemical rays, while the central area retained them. The redness of the skin was produced only in the central area, a clear proof of its dependence on the chemical rays.

P. S.

SCHÖBL (Prague). Specific and Tubercular Choroiditis. *Centralblatt für prakt. Augenheilk.*, Nov., 1888.

This paper gives an interesting account of two cases of choroido-retinitis, the first syphilitic, the second tubercular ; the clinical history, ophthalmoscopic appearance, and the result of microscopic examination in each are given as follows :—

CASE I.—The patient, a woman of from 30 to 35 years of age, with a distinct syphilitic history and a well marked specific skin eruption, was first seen by Prof. Schöbl in 1865. She was weak and much reduced in health. Disturbance of vision, according to her own account, had commenced shortly after her marriage some ten years before ; general mistiness of sight and the presence of sparks flashing before her were the early symptoms complained of ; the right eye was the first affected. When seen by the author V. = only hand-movement with either eye at 1 metre ; it had rapidly got worse during the few weeks prior to examination. *R. eye* : Focal illumination detected some fine punctate opacities in the lower half of the cornea, but whether these were in the deepest layers of the cornea proper or on Descemet's membrane could not be determined. The ophthalmoscope showed in the central region a large reddish-yellow patch about four times the size of the disc, and distinctly raised above the level of the surrounding retina. Near this central patch were a few smaller ones, and on its borders some dark pigment spots ; the disc was congested, especially on the temporal side, and its margins very indistinct ; the surrounding retina greyish in colour ; no trace of hæmorrhage old or recent could be found ; in the vitreous numerous dust-like opacities, chiefly at the posterior part. *L. eye* : Outwardly nothing abnormal ; the optic nerve was of a dirty pale colour ; between it and the macula, and covering the latter, there was a small flat bluish-grey detachment which was non-transparent ; a few reddish-yellow spots like those of fresh disseminated choro-

ditis were seen in the periphery ; pigment in some places unduly abundant, in others very sparse ; in this eye also entire absence of hæmorrhages ; the vitreous opacities were less numerous than in the right. The case was diagnosed as specific choroido-retinitis, the author adding that central changes corresponding to those in the right were probably also present in the left eye, but concealed by the retinal detachment—a suggestion which, as he notes, was not verified by subsequent examination. Shortly afterwards the patient died from an attack of pleuro-pneumonia ; the globes were procured and preparations of the right made as soon as the necessary hardening permitted, while the left was reserved for future use.

On section the choroid was seen to be much thickened by numerous irregularly oval swellings, the largest, which was in the macular region, measuring in its greatest thickness more than 1 mm. The others, of different sizes, and closely connected with each other, extended in an uneven line towards the periphery, chiefly on the temporal side. Under the microscope the smaller swellings were proved to be due to a simple accumulation of round cells ; the large central one, however, showed a distinct layer formation with diffuse infiltration of round cells, among which were also numerous cells from the pigment epithelium of the retina. There was almost no trace of blood-vessels in the central nodule ; in other parts of the affected choroid the arterial coats were thickened, and in some instances complete obliteration of the arteries had occurred ; in many hyaline degeneration was observed. Between retina and choroid was a thin structureless layer, but in the retina itself, beyond some partial degeneration of the rods and cones, no changes were detected. The author notes, however, that at that time he had only a fairly good microscope at command. In the left eye, examined many years later, a condition closely resembling that of the right was present, except that the chief choroidal disturbance was here peripheral, while under the central retinal detachment already referred to there was comparatively little change. The microscopic characters of the two globes were identical. Schöbl concludes this part of his paper with the remark, that while

the ophthalmoscopic appearance seemed typical of syphilis, yet, so far as the pathological condition of the choroid is concerned, he has seen cases of Bright's disease where the changes, if less marked in degree, were very similar in character. He thinks that in this instance there is little ground for any diagnosis other than syphilis—more especially as no symptoms of nephritis were detected during life, but reserves his final opinion on the point till he has again carefully studied the case.

CASE II.—Anna T., æt. 36, complaining of impaired vision of the right eye, was first seen towards the end of 1885. Externally there was nothing abnormal, and the media were clear. *Ophthalm. Examination*: O.N. much congested, with blurred edges; outwards from the disc, over an area in length about six times and in breadth five times its diameter, there was a dusky retinal haze; the vessels were large and tortuous; no traces of hæmorrhage, fundus otherwise normal. $V = \frac{6}{80}$, the patient observing that a dark cloud always rested on the objects at which she looked; family history good; no evidence of syphilis could be obtained. She was next seen in the following spring; V now = fingers at 0.5 metre. There was still no external abnormality, but a faint cloudiness far back in the vitreous could just be made out. O.N. less congested than before and the margins clearer; over the area where the retinal haze had previously been seen, there was now an unevenly flat tumour, whose height from the level of the surrounding surface was measured as rather more than 1 mm. The retina covering the tumour was diffusely pigmented but not detached. A careful examination for any signs of tubercle in the lungs gave a negative result. Patient left the hospital, refusing to consent to enucleation, which was urgently advised. She returned in June, this time anxious for the operation; there was now pain over the forehead and temple, some photophobia and lachrimation, cornea smoky, with moderate surrounding injection, shallow anterior chamber, iris slightly discoloured, pupil wide and barely active, $T + 1$; in the vitreous were thick cloudy opacities which obscured all fundus details. On the fifth day after excision she was dismissed "well." Shortly afterwards she

developed symptoms of phthisis pulmonalis, and died in January, 1887. Section of the hardened globe showed an irregularly nodular swelling of the choroid which extended from the temporal margin of the disc outwards almost to the extreme periphery, 12 mm. long, 9 mm. broad, and its greatest thickness slightly exceeding 2 mm. The colour was yellowish-brown, and on its surface were a few pale spots. The whole tumour was studded with round or oval nodules, the largest of which was situated close to the macula and measured in its longest diameter just 2 mm. The sclera was thickened, infiltrated with round and pigment cells, and in parts incorporated with the choroidal swelling, so that the limits of the two could not be defined; in the tumour substance only few blood-vessels were seen, and these for the most part were either greatly diminished in calibre, or completely obliterated by thickening of the endothelium; the outer coat of the arteries was, as a rule, also thickened; the vessels, especially the veins, in the immediate neighbourhood of the tumour, were much enlarged. Under the microscope the large central nodule showed superficially a mass of caseous material and deep to this a few giant cells; still deeper were numerous oblong and spindle-shaped epithelioid cells with glancing nuclei, between which a fine network-like stroma was visible; the remaining part of the nodule consisted of simple round cells. Except that in some no caseous degeneration was observed, the structure of all the smaller nodules was identical with that of the large one. The retina was much thickened, in great part owing to abnormal increase of its pigment epithelium. Over the affected area, the rods and cones were almost completely absent, being replaced by a thin stratum of structureless tissue; the two nuclear layers, as also the layer of new cells, were infiltrated with round cells, and numerous pigment masses, some of them reaching almost to the membrana limitans interna, were observed; on the nasal side of the disc—the choroid here being perfectly healthy—numerous small nodules, resembling in structure those already described, were found in the deep retinal layers. The vascular changes in the retina corresponded with those of the choroid; a careful search for tubercle bacilli resulted

in their detection throughout the tumour substance, some of the nodules containing them in special abundance. There can, the writer thinks, be no doubt that these nodules were all essentially submiliary tubercles, that the choroid was first affected, and that the disease spread thence to the retina and lungs. It should, perhaps, be added that a curious error arose in connection with these two cases, to correct which was indeed the primary reason for the publication of this paper. Without going into details, it may be sufficient to explain that a full description—with plates—of this tubercular eye (Case II.) was published in Czechish by one of Schöbl's assistants, but the changes ascribed to syphilis under the impression that the globe was really the hardened left eye of Case I. ; it turned out that the eyes had been transferred to their wrong bottles by a careless attendant in the laboratory. The mistake was discovered by Schöbl, who had not previously seen either sections or plates, but only after it had obtained a wide circulation by the reference of other authors to the paper in question.

NORMAN M. MACLEHOSE.

PICQUÉ (Paris). A Critical Study on the Pathological Anatomy and Pathogenesis of Optic Neuritis. *Archives d'Ophtal.* VIII., Nos. 5 and 6.

(Continued from p. 145.)

Lesions of the Nerve in its intra-orbital Course.—In neuritis of central origin most authors deny changes in this portion of the nerve; this statement is made on insufficient grounds; the fact that papillitis can pass off without giving rise to functional trouble is no proof that the nerve is unaffected, and, though it is true that the lesions of the nerve in most varieties of retrobulbar neuritis give rise to functional trouble, yet nerve lesions do occur both with and without such trouble, and there can be degrees in the functional defect as there can be in the anatomical changes. Further, there may be changes which pass off after death, as in some cases of slight papillitis, in which there is no alteration of the nerve fibres or proliferation of the tissue of the papilla, and when slight papillary changes do persist, it may very probably be due to the fact that the lesions have been exaggerated at the disc by its special vascular system. At any rate, we should be very reserved in absolutely denying changes in the course of the nerve. On the contrary, the partisans of this theory go out of their way to explain away changes in the nerve when they meet with them by describing them as due to ascending neuritis or as cases of extension of retrobulbar neuritis to the disc. Now this does occur in some cases, but they are preceded by typical evidence of retrobulbar neuritis. Graefe admits that lesions can extend from before backwards, from the papilla along the nerve; what evidence is there that they are not simultaneously affected? Again, it need not be an interstitial process as in retrobulbar neuritis; these writers seem to maintain that a descending neuritis must of necessity take this form, which is quite inadmissible. However, as absolute proof is wanting that changes do occur, the attention of histologists should, therefore, be especially directed to the investigation of the point.

Retrobulbar Neuritis.—There are numerous points of analogy between this and neuritis of central origin ; and in many cases the retrobulbar origin is far from being made out. Indeed, this group, though it possesses the special clinical symptom of a central scotoma, has been more or less constituted by Graefe by a process of exclusion, and every case of neuritis which was not accompanied by obvious cerebral trouble was placed in it, though, as a matter of fact, in many cases of central origin cerebral symptoms may be entirely absent. Pathological anatomy has, however, shown the reality of this group, and therefore the term should be preserved. A point authors insist upon is the absence of all ophthalmoscopic changes ; this, while true of most cases, is not so of all, for in a certain number they appear later on ; certainly this papillitis followed by atrophy, as in toxic amblyopia, for instance, is only one variety of retrobulbar neuritis, and it is not certain that it represents the whole class ; perhaps the alleged absence of all ophthalmoscopic signs at the beginning, arises from the fact that when they have occurred, the cases have been arbitrarily placed in the category of papillitis with ascending neuritis. From an anatomical point of view, this disease presents two forms, neuritis and perineuritis, one generally a consequence of the other.

Perineuritis.—The lesion consists essentially in infiltration of the arachnoid tissue and thickening of the trabeculæ of the subdural and subarachnoid spaces ; the thickening of the arachnoid sheath extends to the most internal sheath derived from the pia mater, thus progressively obliterating the intravaginal space. It is important to notice, that except in rare cases, the external dural sheath escapes the inflammatory process. Following these lesions changes take place in the nerve, due, according to histologists, to trophic alterations brought about by cicatricial contraction, or obliteration of the vaginal vessels, but it would be simpler to consider them as merely an extension of the perineuritis.

Neuritis.—Under this title are described different varieties of interstitial neuritis, which may be partial or total, ascending or descending, or developed on the spot ; this last has been especially described as retrobulbar neuritis, it

generally arises from an inflammatory process going on in the orbit and is consecutive to perineuritis ; in this connection it is curious again to notice that this dural sheath escapes, and the lesions seem rather to be localised in the most internal (pial) sheath. There is nothing special in the lesions of interstitial neuritis ; it is here, as elsewhere, a question of sclerosis of the interstitial tissue, which cuts in two ways on the nerve fibres ; they either disappear, compressed and choked by the interstitial tissue, or they become narrowed and assume a gelatinous appearance—a state quite different from that seen in tabes, where the lesion, though analogous, is primary. Rarely there is colloid or calcareous degeneration. Writers on this subject maintain that even in infective lesions of the orbit, this neuritis is localised, and has very little tendency to invasion ; this does not agree well with the germ theory of neuritis, for in that of central origin the microbes are supposed to traverse the intravaginal space to set up changes at the disc, while in the retrobulbar variety they must cross the same space, and yet only set up a localised interstitial neuritis in the nerve. Here again is an instance of the arbitrary manner in which distinctions have been made, and there is really no reason why we should look upon a neuritis that accompanies papillary lesions as an ascending neuritis, nor need we consider that retrobulbar neuritis is almost always localised.

Further, in retrobulbar neuritis secondary to lesions of the cavity or walls of the orbit, De Wecker and other writers point out in certain cases changes at the papilla, and contend that these are only cases of papillary stasis, unmindful of the fact that when speaking of neuritis of central origin, they point out this identity of stasis and papillitis. They say nothing about the condition of the nerves in these cases, but for neuritis depending on tumour of the brain they describe an interference in the circulation of the nerve, characterised by œdema and progressive ischemia. In the same way, in tumours of the orbit De Wecker ably describes papillary stasis, but if true papillitis should arise, he maintains it is because the tumour has encroached upon the cranial cavity and has involved the intracranial lymph spaces. Whatever may be the nature

of this papillary change it terminates sometimes in the case of tumours of rapid growth in progressive atrophy, and this is more in keeping with an inflammatory change than mere stasis : unfortunately, histologists give no information as to the conditions of the nerve ; it would be interesting to see if there is not evidence of interstitial neuritis. De Wecker, however, attributes the transformation of the nerve into a fine band without any nervous elements to the effect of compression only, and not to neuritis.

It is the lesions of the spontaneous retrobulbar neuritis that histologists have especially noted.

The observations of Samelsohn and Vossius have given rise to different interpretations, but they show that there are changes extending from the chiasma to the retina, which follow the course of the macular fibres and are central as far as the penetration of the central vessels ; from this point they extend in the form of a cone, gradually becoming peripheral towards the disc. Samelsohn's observations did not extend beyond the optic foramen, and he thinks that inflammatory exudations exist in the nerve only at the optic foramen and point of penetration of the vessels, and the changes in the rest of its course are secondary, while Vossius considers them due to inflammatory process throughout. The number of observations are, however, too few, at present, to draw any absolute conclusions.

Pathogeny.—Picqué argues at considerable length on the different views that have been put forward. Graefe's original theory that inflammation of the papilla follows venous stasis set up by pressure on the cavernous sinus, is disposed of on two grounds ; first, because inflammation does not follow mere stasis, and, secondly, because the free anastomosis between the central and angular veins would prevent such stasis from arising. The more generally accepted view of distension of the optic sheath by cerebro-spinal fluid, under the influence of increased tension, does not bear close investigation ; to produce experimentally on animals any effect on the papilla, it requires a much greater degree of distension than is found in man ; further the investigations of Richet show a "safety valve" action of the spinal canal, which would effectually relieve any excess of

tension that might arise from limitation of the intracranial space by the growth of a tumour ; again, the fluid obtained from a distended sheath is not mere cerebro-spinal fluid, but contains leucocytes and masses of fibrin, and is evidently an inflammatory exudation depending on the condition of the nerve. After calling attention to the fact that it is usually those tumours that develop near the meninges that give rise to papillitis, he alludes to Deutschmann's germ theory, and considers that it is true so far as the nature of the process is concerned ; but false as regards the manner of progress, and he concludes by stating that in the majority of cases the inflammation extends from the meninges to the papilla by way of the optic nerve, and that, probably, the papillary stasis is the result of a concomitant meningitis in cases of cerebral tumour.

With regard to the pathogeny of retrobulbar neuritis, he speaks of those cases that are due to lesions of the wall or contents of the orbit in contradistinction to those that arise spontaneously ; the former he considers as probably due to retention by the lymphatics and not to continuity of tissue, because the external sheath usually shows no changes ; with regard to many of the latter, there is no proof that they are of peripheral causation at all, especially as changes have been noted in the nerve as far as and even beyond the chiasma ; the fact of the macular bundle being alone affected does not preclude the possibility of central causation.

In conclusion, he expresses his opinion that the classification of all cases of optic neuritis should now be held in abeyance until further investigations have been made on the subject.

R. W. DOYNE.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, MAY 2ND, 1889.

DAVID LITTLE, M.D., Vice-President, in the Chair.

Transparent Cyst of the Iris.—Mr. Arthur Benson (Dublin) read an account of a transparent cyst of the iris occurring in a man, aged 20. It had first shown about a year previously, disappeared again for a few months, and reappeared. It then grew rapidly till it filled three-fourths of the anterior chamber, at which size it remained stationary till it was removed by operation. The cyst wall was almost perfectly transparent everywhere except at the back, where it was incorporated with the pigmented portion of the iris. It lay in contact with the cornea over more than half its internal surface, and was accurately applied to the angle of the anterior chamber. At one point the pigment of the iris protruded on to its edge. The eye was otherwise normal, tension normal, and vision $\frac{6}{80}$ only. There was no definite history of injury, but he acknowledged to having got a husk of oats into his eye some time before, and there was a leucoma with a transparent centre occupying the upper periphery of the cornea which might have been produced by the injury. The cyst was removed by operation. A keratome was passed into the sclerotic, 0.5 millimètre behind the corneal margin, and into the cavity of the cyst. Through this incision the cyst was removed with the adherent iris. The cornea, where the cyst had been in contact, was next day white and milky (from tearing of the endothelial cells with which the tumour had been in contact); this passed off in a few days, leaving a perfectly healthy cornea, and vision $\frac{6}{24}$, which has since improved.

The wound healed as after an ordinary iridectomy. The growth consisted of a large cyst, lined with a layer of compound epithelium five or six cells deep, and contained clear fluid indistinguishable from aqueous. The pupil border of the iris appeared little changed, but there was much difficulty in determining the exact conditions, owing to the fact that the growth was hardened and cut when collapsed. Drawings of the appearances before and after the operation, and sections and photographs of the portion removed, were exhibited.

A Form of Retino-choroiditis due to Concussion of the Eye.—Mr. J. Hutchinson, jun., read this paper, illustrated by the case of a healthy boy, aged 13, who received a blow on the front of the eye (not causing any wound) in June, 1888. Traumatic mydriasis had persisted ever since, and a curious form of posterior polar cataract; but the chief feature of interest was pigmentation of the retina around the disc and about the macular region, the periphery being normal. This pigmentation had decreased somewhat during the nine months that had elapsed since the accident, it being first observed about ten days after it, then increasing, and subsequently becoming less marked. The disc had become decidedly atrophic, the visual field limited, and sight was reduced to $\frac{6}{8}$ and 19 J. In a similar case (so far as the pigmentation was concerned) the changes were limited to the inner side of the disc; here again the visual field was correspondingly limited. The injury had been due to an explosion. Mr. Hutchinson said Professor Becker had described similar cases, the pigment being sometimes confined to the part of retina opposite the point of impact, in others more widely scattered. The fact that this form of retino-choroiditis was almost invariably confined to one eye, and unaccompanied by any sharply defined choroidal atrophy, but often co-existed with linear rupture of the choroid or concussion-cataract, helped to a diagnosis of the disease in a doubtful case, the history of injury being of course of value. The pigmentation might become general throughout the whole of the retina, though this seemed to be exceptional. The serious effect upon the vision rendered it important carefully to examine the fundus in all cases of recent

concussion-injuries, and it was probable that some cases of choroiditis attributed to syphilis, etc., really owned a traumatic origin.

Dr. Griffiths (Manchester) referred to the observations of Haab, of Zurich, at the International Ophthalmological Congress at Heidelberg on diseases of the macula, in which he showed that this part of the retina exhibited a distinct predisposition to disease. He himself had had two cases of persistent mydriasis in which there was no lesion of accommodation.

Mr. Lawford added that Haab, in the paper referred to by the previous speaker, discussed the question of injury to choroid and retina by *contrecoup*, and was of opinion that in cases of concussion of the eyeball the retinal and choroidal changes were always more marked at the sight of impact of the missile.

Mr. Doyne said that though in his own case there was pigmentation of both retinae, yet on inquiry a history of traumatism to the second eye was elicited.

Dr. Collins referred to a case recorded in *St. Bartholomew's Hospital Reports*, in which permanent iridoplegia followed a blow on the eye; there was no cycloplegia. Transient nebulosity of the lens followed, and afterwards the patient returned with micropsia, and localised retinitis in the neighbourhood of the macula was discovered.

Mr. Bronner (Bradford) had carefully examined many cases of slight traumatism, and had found limited retinal changes in a large proportion of them.

Dr. Eales quoted a case in which a man was struck on the temple with a heavy stick; after five or six weeks changes occurred, which resulted in permanent temporal hemianopsia; the case seemed in favour of the theory of *contrecoup*.

Mr. Silcock also supported the idea of injury of the eye by *contrecoup* being possible, though he regarded the causative condition as one of increased intra-ocular tension which occurred opposite to the part of the sclerotic indented by the blow.

Mr. Jonathan Hutchinson said it was important to extend the observation of these cases over a considerable

period of time in order to determine how long these degenerative changes continued in progress.

Dr. Little related a case where, two years after a blow on the eye, the sight deteriorated, and extensive pigmentary changes were found over the whole of the fundus.

Mr. Hutchinson, jun., in reply, thought the theory of *contrecoup* should still be believed in ; it certainly served to explain injuries of the skull and of the brain. Several of the cases quoted bore out the view that these changes might begin within a few weeks of the occurrence of the injury.

Three Cases of Orbital Tumour.—Dr. Ramsay (for Dr. Reid, Glasgow) read notes of three cases of tumour of orbit. (1) Fibrous tumour which occurred in a man aged 75, and, after existing for seven months, began rapidly to increase in size. It was successfully removed through an incision at the outer part of the upper lid. (2) Sarcoma of orbit in a man aged 30. The growth had been noticed for two years, and had given rise to displacement of the eyeball and loss of vision of that eye. It was removed by dividing the upper lid vertically near its centre, and dissecting down to the capsule of the growth. (3) Carcinoma of the orbit in a man aged 75. The removal of the growth was accomplished with great difficulty, in consequence of its deep attachments and the necessity of preserving the eyeball, the other eye being useless. Three or four months after the operation a secondary growth occurred in front of the ear, and from this severe hæmorrhage occurred. Death ensued ten months after the removal of the orbital growth.

Adenoma of Lacrimal Gland.—Mr. Simeon Snell (Sheffield) related two cases and exhibited the specimens. The first occurred in a servant girl aged 25, and was removed on December 15th, 1879. Shortly before her sixteenth birthday the left eye was noticed to be larger-looking than the right, and gradually became more so. At the time of operation the tumour was felt beneath the upper eyelid, the eyeball being displaced forwards, downwards, and outwards, but sight was unaffected. The growth was removed by dividing the external commissure and then dissecting it out. The eyeball returned immediately to its normal position. The tumour was the size of a large walnut, and flattened on two sides. The second case occurred in a child aged 8

months. A swelling beneath the left upper lid had been noticed when the child was two months old. On November, 15th, 1888, a small, freely movable tumour, the size of a bean, was easily removed. Microscopical examination in both specimens revealed acini lined with epithelium.

Glaucoma and Staphyloma Supervening Two Years and a Half after Scleral Puncture for Detached Retina: (?) New Growth Internally at Site of Puncture.—Mr. Snell also related this case. The patient, a policeman, aged 43, came under treatment in December, 1885, for detachment of retina at the outer and lower part. Vision in this eye $\frac{10}{80}$; not improved. There was no assignable cause for the detachment. On December 21st, 1885, a puncture with Graefe's knife was made between the external and inferior recti, near the equator. On February 8th, 1886, the puncture was repeated, the site chosen being nearer the external rectus. Vision improved after this to $\frac{20}{40}$, the detachment being decidedly less. The patient reappeared on August 8th, 1888, with acute pain in the eye and T + 2; vision reduced to perception of light; severe pain had been present for four days; the sclerotic was staphylomatous at the site of puncture. The eyeball was enucleated on August 20th. The two halves of the globe were exhibited, and showed a spindle-shaped mass situated internally to the staphyloma. Its microscopic characters, in the opinion of Dr. Joseph Coats, suggested an inflammatory condition rather than sarcomatous growth.

Card Specimens.—The following patients and card specimens were shown:

Dr. Reid: (1) Microscopic Sections of Follicular and Trachomatous Conjunctivitis; (2) Instrument for demonstrating Conjugate Foci.

Dr. W. J. Collins: (1) Granulation Iritis from Non-penetrating Injury; (2) Case of Retinal Degeneration and Detachment with Albuminuria; (3) Transient Spontaneous Symmetrical Œdema of Eyelids.

Mr. T. Phillips: Case of Cholesterine in the Retina.

Mr. Adams Frost: Changes occurring in a Macular Retinal Hæmorrhage.

Mr. Silcock: Syphilitic Inflammation of Tenon's Capsule.

Mr. MacKinnla: Unusual Hypertrophy of Conjunctiva and Sub-conjunctival Tissue.

RECENT LITERATURE.

A. RETINA. OPTIC NERVE. CENTRES.

DUJARDIN. Colobome Maculaire.

Jour. des Sc. Méd. de Lille, Feb., 1889.

SCHOELER. Des Opérations sur la Rétine.

Soc. de Med. de Berlin, Feb., 1889.

SCHOELER. Zur Operativen Behandlung und Heilung der Netzhautablösung.

Berlin, 1889. Hermann Peters.

SILEX. Two cases of Coloboma of the Macula Lutea.

Arch. of Ophthal. XVIII. 1.

ULRICH. On Choked Disc and Œdema of the Nerve Trunk.

Arch. of Ophthal. XVIII. 1.

ULRICH. On Choked Disc and Consecutive Atrophy of the Optic Nerve.

Arch. of Ophthal. XVIII. 1.

B. UVEAL TRACT. VITREOUS AND AQUEOUS. LENS.

CLARK. Isolated Rupture of Iris and Choroid by a Rebounding Rifle Ball.

Arch. of Ophthal. XVIII. 1.

KNAPP. Report on a second series of one hundred successive Cataract Extractions without Iridectomy.

Arch. of Ophthal. XVIII. 1.

WEBSTER. A Case of Sarcoma of the Iris.
Arch. of Ophthal. XVIII. 1.

C. CORNEA. CONJUNCTIVA. SCLERA.

CASTAGNÉ. De l'emploi du fer rouge dans quelques affections de la cornée.
Thèse de doctorat. Montpellier, 1889.

CAUDRON. La Kératite Interstitielle a forme d'abcès.
Revue gén. d'Ophtal., April, 1889.

KALT. Sur une tumeur épithéliale bénigne de la conjonctive bulbaire.
Arch. d'Ophtal., March—April, 1889.

STELLWAG. Therapie der Bindehautentzündungen.
Allgem. Wien. Med. Zeitg., 1889, Nos. 1 and 3.

D. ACCOMMODATION. REFRACTION. MOTOR APPARATUS

POMEROY. Cases illustrating the influence of convex glasses in correcting the Convergent Squint of young children, mostly without Tenotomy.
N. Y. Med. Journ., April 20th, 1889.

E. EYELIDS. LACRIMAL APPARATUS. ORBIT.

EPERON. De la correction opératoire du déviations oculaires verticales d'origine paralytique en particulier par l'avancement musculaire.
Arch. d'Ophtal. March—April, 1889.

HALLOPEAN ET WICKHAM. De l'ectropion consécutif à la Syphilis mutilante de la face.

Ann. de dermat. et de syphil., Jan., 1889.

KÖNIGSTEIN. Praktische Anleitung zum Gebrauch des Augenspiegels.

Urban & Schwarzenberg, Wien und Leipzig, 1889.

WEEKS. A case of Epibulbar Echinococcus, with a review of the Literature of Echinococcus Cysts of the Orbit.

Arch. of Ophthal. XVIII. 1.

WEEKS. A case of restoration of the Integument of the Upper Lid by transplanting a Flap without a pedicle.

Arch. of Ophth. XVIII. 1.

VALUDE. Essais de tuberculisation expérimentale du sac lacrymal.

Arch. d'Ophtal., March—April, 1889.

F. MISCELLANEOUS.

BULL, C. S. The value of electro-therapeutics in Lesions of the Optic Nerve.

N. Y. Med. Journal, April 27, 1889.

D'ARIER. Deux cas d'arthrite à la suite d'ophtalmie purulente.

Arch. d'Ophtal., March—April, 1889.

DE WECKER. Glaucoma et Inflammation.

Arch. d'Ophtal., March—April, 1889.

GAGET. De l'Ophtalmie Sympathique.

Prov. Med., Jan., 1889.

GROSSMANN, L. De l'ossification dans l'œil.

Arch. d'Ophtal., March—April, 1889.

KÖNIGSTEIN. Die Behandlung der häufigsten und wichtigsten Augenkrankheiten.

Centr. Bl. f. d. ges. Therap., 1889, No. 1.

LIPPINCOTT. On the Binocular Metamorphopsia produced by correcting glasses.

Arch. of Ophthal. XVIII. 1.

LUBLINSKI. Ueber Ophthalmia Photo-electrica.

Wien. Med. Pr., 1889, No. 4.

VERDESE. Recherches expérimentales sur la perforation précoce de la membrane de Descemet dans les processus ulcératifs infectants de la cornée.

Arch. d'Ophtal., March—April, 1889.

CONGENITAL MALFORMATIONS OF THE EYEBALL AND ITS APPENDAGES.

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LECTURE I.*

Before describing the congenital peculiarities found in the eyeball and its appendages, it may be of some advantage to you if I spend a few minutes in running rapidly over the *development* of these structures, so as to refresh your memories a little. For I need hardly say that it is impossible to understand how malformations occur if we are ignorant of the normal developmental processes. Those of you who are already familiar with the subject must pardon me for what may seem needless repetition of well-known facts.

In most vertebrates, and in all mammals, the first trace of an eye is found in the form of a hollow out-growth from the anterior part of the medullary tube, or, in other words, from the cerebral part of the rudimentary central nervous system. The wall of this outgrowth, or primary optic vesicle, as it is called, is a mere local continuation or prolongation of the wall of the cerebral vesicle. It is, therefore, epiblastic in origin, and consists at this stage of closely packed, round, undifferentiated cells.

As this primary optic vesicle pushes outwards, its further end comes into immediate relation with the

* Delivered at the Hospital for Sick Children, Great Ormond Street, on May 7th, 1889.

cuticular epiblast. At the point of contact this cuticular epiblast next undergoes involution and enlargement, forming the future lens, and thus pushes inward the adjacent wall of the optic vesicle, so as to form a cup-like hollow, called the *secondary* optic vesicle or optic cup. The anterior and posterior walls of the primary optic vesicle are thus approximated, and ultimately come into contact, except at one point corresponding to the stalk of the vesicle. This stalk is the future optic nerve; while from the anterior and posterior walls of the vesicle are developed respectively the retina proper, and the pigment-epithelium. The lens lies in the hollow of the optic cup, but does not completely fill it; the significance of the space existing between the lens and the cup-wall will be apparent immediately. Again, the mouth of the optic cup is not quite closed by the lens at this stage, as there is a gap in the lower lip of the cup, continuous with a cleft now found in the inferior part of the vesicle and of the adjacent part of the optic stalk, called the *choroidal fissure*. Through this aperture, or cleft, a process of mesoblast passes into the space already mentioned as existing between the lens and the cup-wall. From the mesoblastic elements so introduced are formed the central vessels of the optic nerve, the vitreous humour, and the blood-vessels which pass through it to the lens, which latter is then surrounded by fibrous and vascular structures constituting the capsulo-pupillary membrane. The vessels of this membrane, and those of the retina, are therefore developed from the same mesoblastic process, and it is thus easy to understand how the artery supplying the former, the hyaloid artery, comes to be a direct branch of the central retinal artery.

The lens, as has been observed, originates in the form of an involution of cuticular epiblast, and is at first hollow. The posterior wall, however, increases rapidly in thickness by the differentiation of its cells into long fibres, so that it soon obliterates the cavity of the rudi-

mentary lens. The long fibres originating in the cells of the posterior wall thus come into close contact with the anterior wall, which latter retains its simple cellular structure. The subsequent growth of the lens is caused by the formation of fibres from the cells in its equatorial region. By the growth of these new peripheral fibres—which bend over, anteriorly and posteriorly, outside the outgrowth just described as arising from the posterior wall—this latter is more and more pressed inwards and rendered more compact, and persists as the so-called “nucleus” of the fully-developed lens.

The choroid, iris, and sclerotic owe their origin to mesoblast, and the cornea is chiefly derived from a similar source, but with the assistance of cells of the outer layer of cuticular epiblast.

The eyelids first appear after the formation of the eyeball, being formed from folds of integument which gradually approach and meet together in front of the eye. There is still doubt as to the exact manner in which these folds originate. The usual description given is that they come from above and from below, and meet in the middle line, in the position corresponding to the palpebral fissure. The edges of the lids are glued together by the epithelial exudation until near the close of intra-uterine life.

The ocular muscles are all developed from mesoblast, and are found at an early stage.

The nasal duct, or lacrymal canal, is to be regarded as a persistently open part of the fissure between the fronto-nasal process and the maxillary plate of the embryo.

The first congenital malformation that must be considered is that very gross one where neither eyeball is developed—a condition called *Anophthalmos* or *Bilateral Anophthalmos*. In all the cases of this affection in which a post-mortem examination has been made, there has not been the least indication of a globe of any sort, while the ocular appendages (lids, conjunc-

tival sac, external muscles, lacrymal apparatus) were nearly always represented in some way, and were usually fairly perfect. The optic tracts, chiasma, and optic nerves were all absent in one case, in which there was also a very defective condition of the cerebrum. In no case was the optic nerve properly developed within the orbit, and in several the intracranial part was noted as defective. In other words, and speaking genetically, the primary optic vesicle, when developed at all, never arrived at a stage admitting of the formation of a secondary optic vesicle, and was usually simply a short abortive bud on each side. Again, the mesoblastic tissues of choroid and sclerotic, possibly from the absence of any secondary optic vesicle on which they could be moulded, were unrepresented; while the other orbital mesoblastic formations were generally developed much as usual. Further, in nearly every case recorded, there was a conjunctival sac, and the lids have almost invariably been found represented, though the palpebral aperture is frequently but partially formed. Doubtless the pressure of a globe is greatly instrumental in keeping the palpebral fissure patent. It is the *earlier* development, therefore, that has been particularly interfered with, the later development being fairly normal.

Mr. Treacher Collins, to whose excellent paper* I am indebted for statistics of the recorded cases, considers the question of causation. He finds that "neither hereditary influence nor consanguinity of parents has been shown to account for the large majority of cases." In a considerable number of the cases some maternal impression or fright is mentioned as having occurred during pregnancy; and, when this occurs early in pregnancy, he concludes that some causative connection may be accepted as possibly existing, in the absence of any other known cause. There seems to be no great tendency to other deformities in these cases, but the

* Royal Lond. Ophth. Hosp. Rep., vol. XI., p. 429.

subjects of them seldom live long, much the oldest example recorded being at the age of 15 years.

Unilateral Anophthalmos or *Monophthalmos*, is, judging from statistics, more uncommon than the bilateral form. The condition is quite similar to that just described, except in being one-sided. The second eye is reported as normal in six of the twelve published cases, and as no note is given of its condition in another, the probability is that it was normal in this case also. Of the remaining five cases, in two it was microphthalmic; in another it had coloboma of iris and choroid; in one it was amblyopic and nystagmic, and in one it was stated to have "keratitis." Developmentally, then, these cases of monophthalmos are to be explained by an absence of, or an arrest in, the primary optic vesicle on one side, not necessarily associated with any abnormality in the other optic vesicle or its development. All these cases were alive when reported, and there is no account yet in literature as to the conditions found on autopsy.

In some cases the primary optic vesicles appear to have originated closely side by side, and to have joined as they developed further. This close position and ultimate union are probably to be accounted for by the absence of any median olfactory projection, for total absence of the organ of smell has, I believe, invariably been found in association with this peculiarity. The ultimate result is the condition known as *Cyclopia*, characterised by the presence of a single eye in the middle line of the forehead, with indications of its double nature in the existence of two crystalline lenses, a double set of extra-ocular muscles and nerves, and four eyelids. The fact that only one sclerotic, one choroid and iris, etc., are formed, goes to prove that these mesoblastic structures are all *moulded* on the secondary optic vesicle, and that there is no tendency to their formation in the absence of the epiblastic centre. We have already observed that the same result obtains in Anophthalmos: there is no secondary optic

vesicle, and neither do we find the tunics usually developed around it. It would seem as if this special differentiation of mesoblast could only occur in the presence of its proper epiblastic central mould. The other orbital mesoblastic structures, on the other hand, have their dual formation as if in two distinct normal orbits, and the same seems to hold good to a certain extent in respect of the eyelids.

Again, the *position* of the epiblastic involution concerned in the formation of the lens is seemingly determined by the point of contact between the primary optic vesicle and the cuticular epiblast. The presence of two lenses in such an eye would thus be accounted for. The cornea is occasionally double in these cases; this we are prepared for, in as far as it is originally formed independently of any moulding on the structures developed from the optic vesicles.

In some cases of cyclopia the welding of the optic vesicles has not been so complete, and then we may have the double nature of the globe shown in the choroid and sclerotic. Sometimes the two eyes are placed close together and divided only by a narrow septum. Between this condition and the abnormally widely separated globes occasionally met with, there are all degrees of separation.

Plurality of Eyes or *Polyoculi* is rather a true monstrosity than an example of mere malformation, and is due apparently to development from a double anterior cerebral vesicle. In a case of this kind described and figured by Wilde, the whole of the upper part of the face was double, and the four eyes present seem to have been developed normally enough from the bifid cerebral vesicle, one pair corresponding duly to each division of it.

In the malformation next to be considered, *Cryptophthalmos*, the ocular structures developed from and around the secondary optic vesicle are perfect, while those originating in the cuticular epiblast and mesoblast

are wanting. No eyelid or conjunctival sac, therefore, is present, and the eyes are quite hidden by skin passing smoothly over the mouth of the orbit. It is only on dissection of the orbit that we come upon the buried eyeball, in which we detect all the posterior coats with the retina and optic nerve, but no lens.

I now come to speak of less gross cases of malformation, and it will, for the most part, be convenient to consider them under different headings, according to the part of the eyeball or its appendages which is involved. I shall begin, however, by a short account of conditions in which the whole globe is involved.

In *Microphthalmos* the eye is undersized at birth—*i.e.*, out of the usual proportion to the rest of the body. Cases of this description may be roughly arranged in two great groups—*Developmental* and *Pathological*.

In the first group the cause of the microphthalmos is some arrest in the development of the secondary optic vesicle and the parts surrounding it, and the condition is commonly bilateral. Three varieties of developmental microphthalmos have been described by Gescheidt,* according to the *stage* at which the arrest took place. But it is doubtful if we are justified, from our present knowledge, in accepting this classification. In all, the secondary optic vesicle is at fault; it must always, therefore, be an early arrest; but cases vary in the greater or less perfection of the development of the surrounding mesoblastic tissues. Thus, in some, the iris is wanting; in others it is present but imperfect, from the persistence of coloboma, or from the irregular position of the pupil; while in others all the parts of the eyeball are natural except as regards size. In some cases the cornea is relatively too large, and in others, again, too small.

There seems to be a distinct relation between the size of the optic vesicle and the growth of the orbit and

* In Ammon's Zeitschr. f. Ophth. Band. II., p. 257.

adjoining parts of the head. In these cases of microphthalmos, accordingly, the bones forming the orbit are smaller than usual, and the upper part of the face is abnormally small and narrow.

In the second group we place those cases of microphthalmos where one or both eyeballs are small in consequence of intra-uterine disease. In such eyeballs we find evident traces of old inflammation, such as posterior synechiæ, choroidal atrophy, or a shrunken cataractous lens.

The opposite condition, where the eyeball is too large, is called *Megalophthalmos* or *Buphthalmos*. It is rarer than the affection last described, and is more commonly confined to one eye. It is not due to an error of development, but to a congenital pathological condition, probably a form of kerato-irido-choroiditis occurring *in utero*. The cornea is often slightly nebulous, the anterior chamber deep, the iris large and oscillatory, and the sclerotic thin and of a bluish colour.

Among congenital affections of the eyelids, *Coloboma Palpebræ* or *Cleft Eyelid*, first claims our attention. The appearance is not unlike that presented by hare-lip, viz., a perpendicular gap, leading from the free edge, varying in width and in depth in different cases. It may occur in either eyelid, but is more common in the upper. It not uncommonly affects the same lid on both sides, but rarely both lids of the same side, and there is only one case on record where all four eyelids exhibited this defect. It has been frequently found associated with hare-lip, but only once with an ocular malformation (coloboma of the iris).*

Several explanations of this condition have been offered. First, it has been attributed to an arrest in the development of the lids. But if the manner and forma-

* In 47 cases of coloboma of the eyelid, collected by Nicolin, there were no fewer than 14 with a complication of hare-lip. See Dor, über Colobom der oberen Lider. 7th Internat. Ophth. Congress, Heidelberg, 1888.

tion of the eyelids in man is similar to that described in the chick, rabbit, etc., it is impossible to understand how any mere arrest in development of the lids can cause a vertical cleft.

A second explanation, first advanced by Walter Dick about fifty years ago, and subsequently by Braun and Van Duyse, attributes its formation to the action of amniotic bands; but its occasional symmetrical occurrence on both sides is hardly to be accounted for on such an hypothesis. Another view is that some defect, or intra-uterine inflammation, determined the adhesion of the developing lid at one point to the cornea; that, in consequence, the lid ceased to be normally developed; and, again, that in this way the occasional association of dermoid of the corneal conjunctiva with notching of the lids is to be explained.

The last explanation that has been advanced is, I think, much the most reasonable one, viz., that the deformity is the result of the imperfect closure of the upper end of the oblique facial cleft.* This cleft normally exists at an early stage of foetal life on each side of the fronto-nasal process, separating the latter from one or other superior maxillary plate (or upper division of the first branchial arch). According to this view, the arrest of development occurs early, before the lids have yet been formed. In consequence of the persistence of the superficial part of the upper end of the cleft, the upper lid, and sometimes the lower also, will be developed in two parts, and a coloboma result. If, on the other hand, the lower end of the cleft closes imperfectly on one or both sides, we get single or double hare-lip. In this manner, therefore, the frequent association of coloboma of the eyelid with hare-lip is fully accounted for.

Congenital *Ptosis*, or drooping of the upper eyelid, is not nearly so rare a malformation as that last described.

* See Dor, *op. cit.*

It is usually one-sided, and the upper lid is found, on examination, to be peculiarly thin and atrophic looking. Anatomical examination has shown that many, perhaps all such cases, are due to absence or a rudimentary condition of the levator palpebræ superioris. I need hardly say that such cases are carefully to be distinguished from paralytic forms, when other branches of the third nerve will be found almost certainly to have also suffered.

HETEROCHROMIA IRIDUM,

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Persons exhibiting this peculiarity are not very often seen, but I believe are more frequent in this country, where the population has arisen from a great mixture of races, than in most other countries. Within the last few months, however, I have met with eight cases, a brief account of which I now give. On analysing them, one arrives at some striking results.

Eliminating Case 2, whose father was believed to have had heterochromia also, and whose mother I did not find out about; Case 7, who was a very unintelligent individual, and knew little about his parents; and Case 4, all the others were the children of parents of different complexion. Case 4 was peculiar in this, that while both parents were fair, she was dark, in this resembling her father's relatives more than himself.

There seems to be no special tendency for the right eye rather than the left to be the "paternal" one, nor for it to adapt itself in colour to the patient's own complexion.

PATIENT.	HAIR AND COMPLEXION.	FATHER.	MOTHER.	RIGHT IRIS.	LEFT IRIS.	CONDITION OF RIGHT EYE.	CONDITION OF LEFT EYE.
1. F., æt. 18.	Dark.	Fair.	Dark.	Blue.	Brown.	Old Choroiditis. Floating bodies in vitreous.	Normal.
2. M., æt. 40.	Rather dark.	Believed to have had Heterochromia.	(?)	Brown.	Blue.	Normal.	Cataract.
3. M., æt. 33.	Fair.	Fair.	Dark.	Brown.	Blue.	Double Optic Neuritis from Cerebellar Tumour.	
4. F., æt. 40.	Dark. Fast becoming grey.	Fairish, but relatives are dark.	Fair.	Brown.	Blue.	Normal.	Serous Iritis, then Glaucoma.
5. F., æt. 26.	Fair.	Dark.	Fair.	Blue.	Brown.	Choroiditis.	Normal.
6. M., æt. 19.	Dark.	Fairish.	Dark.	Brown.	Blue.	H. As.	H. As.
7. M., æt. 22.	Dark.	(?)	(?)	Hazel.	Brown.	High Myopia. Staphyloma.	High Myopia. Staphyloma.
8. F., æt. 29.	Dark.	Fair.	Dark.	Blue.	Brown.	Serous Choroiditis. Floating bodies in vitreous.	Normal.

Again, looking at these cases in another aspect, we find some material for thought. Case 3 was one of cerebellar tumour producing double optic neuritis, staggering gait, and other symptoms, the suspected cause whereof was verified post-mortem. Case 6 was that of a healthy student of medicine, who came complaining of asthenopia produced by compound hypermetropic astigmatism in both eyes. Case 7 was one of symmetrical high myopia with extensive atrophy of choroid and large staphylomata postica. In the other five cases—in all the cases, that is, in which there was an abnormal condition confined to one eye—the eye affected was that of which the iris was blue, whether the right or left, whether it were the “paternal” or the “maternal” eye. In none of them was there any local cause which might tend to produce disease of one eye more than the other. Case 2 was an engine driver, a strong healthy man, who could in no way account for his having cataract, either from injury or exposure of one eye more than the other. Case 4 was a woman whose father had had “rheumatism,” not gout so far as she knew. She, with her hair early grey, looked as if she were gouty herself, but she had had no symptoms of any such disease. I could in no other way account for her having glaucoma. Case 8 was a highly rheumatic young woman; but neither she nor Cases 1 and 5 had ever had iritis, nor was there in these latter any known diathesis.

What I should like to know is, are “blue” eyes more liable to diseases of the coloured vascular tunic than “brown” ones; or is the above series merely a coincidence? Is there some condition manifested by want of pigment which predisposes to inflammatory and degenerative changes? It would be interesting to find out what proportion of cases of choroiditis, etc., relatively to the population, occur in persons whose eyes are blue, and in those whose eyes are brown. I should like to know, too, whether others have noticed, in their cases of

heterochromia iridum, a greater liability to diseases of the vascular coat on the part of the "blue" eye, such as is shown in the table.

Since the above was written I have got notes of the following two cases.

a. Young lady. Dark brown left iris, left eye healthy. Right iris is light brown or hazel. This eye is affected with cataract. Immediately following on the "double needle" operation for after-cataract, patient had a brief but smart attack of glaucoma. (For the account of this case I am indebted to Dr. Argyll Robertson, under whose care the patient was.) The mother was of dark complexion; that of the father is unknown to me.

b. Woman *æt.* 42, of dark complexion. Patient's father was dark, but mother was fair, with "blue eyes." The right eye, of which the iris is dark brown, is healthy; the left eye has a bluish iris, and is suffering from sub-acute glaucoma.

These cases are either two more coincidences, or two more examples of liability to disease on the part of the lighter eye in heterochromia.

EPÉRON (Lausanne).—On the Treatment of Vertical Deviations of the Eye by Operation, and especially by Muscular Advancement. *Archives d'Ophthalmologie, March-April, 1889, p. 115.*

History of the Subject.—Von Graefe, studying the consequences of persistent paralysis of the superior oblique muscle, declared, on theoretical grounds, that the proper treatment would be tenotomy of the inferior rectus of the sound eye. Nine years later, in 1873, Runeberg published the first case of the kind:—A vertical diplopia of 15° due to a persistent paralysis of the left superior oblique, with contraction of the antagonist, was removed by tenotomy of the right inferior rectus; binocular work was

resumed and the diplopia remained only on looking much downwards.

Knapp, in 1874, published three analogous cases :—1. For the relief of a paralytic vertical deviation, he divided the inferior rectus ; the effect was so considerable that he shortly afterwards divided the superior rectus ; the final result was a downward displacement of the region of the diplopia, which had previously been situated above the horizontal line. 2. A divergent strabismus, probably due to paralysis of the third nerve, was complicated with a considerable upward deviation ; the condition of the patient was improved by division of the rectus of the sound eye and of both external recti. 3. A paralysis of the inferior rectus, with secondary contraction of its antagonists, was improved by division of the superior rectus and subsequent advancement of the paralysed muscle.

Schoeler, in 1875, published the case of a man, aged 65, who had a considerable upward deviation of the left eye due to paralysis of the inferior rectus of traumatic origin and long standing. Division of the superior rectus, followed by advancement of the paralysed muscle, brought the eye nearly into the correct position.

In the same year Runeberg published a second case analogous to his first. The superior oblique was paralysed after typhus ; division of the inferior rectus of the other eye gave at first an over-correction of the diplopia ; the final result was a complete cure.

In 1878, Von Kries recorded three similar cases from the *clinique* of Alfred Graefe, and Graefe himself, in a recent important work on the whole subject of the operative treatment of paralytic deviations (Von Graefe's *Archiv.* 33, 3, p. 179, 1887), has detailed these and three others. The following is a brief epitome of these six cases :—

1. Paresis of left superior oblique ; diplopia for nine months, treated without success ; good tendency to fusion with the help of suitable prisms. Operation : tenotomy of right inferior rectus. Immediate effect : correct position, except when looking down to the right ; obliquity of images no longer perceptible to the patient. Five days later, diplopia again present in the middle line at 15° below

the horizontal. Divided tendon carefully re-separated with the strabismus hook. Thereupon slight upward deviation of the operated eye. Fourteen days later patient resumed his work without difficulty. Re-examined three months later, no trace of deviation.

2. Paresis of left superior oblique of twenty months standing, apparently associated with slight contraction of the right internal rectus; treated without success. Vertical deviation 20° ; horizontal 14° ; with prisms good tendency to fusion. Division of right inferior rectus; deviation immediately reduced to 7° vertical, and 6° horizontal. This deviation persisting during the next three days in spite of exercise in looking upwards, the hook re-introduced and a slight remaining attachment divided. Thereupon diplopia absent, except on looking 40° downwards. Reading still difficult by reason of tendency to over-convergence; careful division of left internal rectus. Result, confirmed six months later, appearance of eyes perfect; slight diplopia on looking strongly downwards to the right; no inconvenience.

3. Paralysis of left superior oblique. Diplopia throughout lower half of fixation-field and extending into upper half. Tenotomy of right inferior rectus. Immediate effect: diplopia absent down to 20° below horizontal. In looking to the left, operative insufficiency; in looking to the right, paralytic insufficiency. Some months later, considerable increase of the operative insufficiency. Re-advancement of the right inferior rectus. Eight days later diplopia, due to operative insufficiency, occurs only on looking downwards to the right.

In the two following cases the action of the superior oblique was impaired not by paralysis, but by local injury:—

4. Insufficiency of left superior oblique caused by cicatrix after orbital necrosis. Diplopia horizontal, homonymous, and vertical. Permanent and complete cure by separation of the cicatrix, and tenotomy of the right inferior rectus and the left internal rectus.

5. Insufficiency of right superior oblique caused by a dog-bite. Tenotomy of left inferior rectus, limited by suture, and of right internal rectus. Two weeks later diplopia still

present on looking down to the left; four weeks later diplopia absent in all directions.

The following is an instance of the very uncommon isolated paralysis of the inferior oblique. Alfred Graefe met with it only five times among 110,000 ophthalmic patients.

6. Paresis of right inferior oblique. Diplopia in primary position corrected by a vertical prism of 20° and a horizontal prism of 3° ; not cured by anti-syphilitic treatment. Tenotomy of left superior rectus: Immediate effect: no diplopia in primary position. Some days later, divided tendon re-separated with good result; this result afterwards annihilated by paralysis of the sixth nerve.

These thirteen cases show that simple tenotomy rather than advancement has hitherto been the means chiefly employed. Epéron urges a more frequent employment of advancement. Before citing his own experience of such operations he discusses the principles which underlie them, following to a large extent the teaching of Alfred Graefe.

Theoretical Considerations.—Premising that operation is justifiable only when the paralysis has persisted many months, Epéron discusses the various possible modes of restoring the muscular equilibrium. In the case of a paralysis of one of the adductor or abductor muscles, four modes of operating present themselves:—

1. Advancement of the paralysed muscle;
2. Tenotomy of its antagonist;
3. Tenotomy in the sound eye of the muscle associated with the paralysed muscle;
4. Advancement in the sound eye of the antagonist.

In the case of a paralysis of one or other of the elevator or depressor muscles, the problem is more complicated, for it concerns 8 instead of 4 muscles, two elevators and two depressors for each eye. Neglecting practical difficulties, there would be 8 possible modes. For example, in a paralysis of the superior oblique, which is the commonest cause of vertical deviation, they would be as follows:—

1. Advancement of the paralysed superior oblique;
2. Advancement of the inferior rectus, its associate in the same eye;

3. Tenotomy of the superior rectus, one of its antagonists in the same eye ;
4. Tenotomy of the inferior oblique, its other antagonist, in the same eye ;
5. Tenotomy of the superior oblique, one of its associates, in the sound eye ;
6. Tenotomy of the inferior rectus, its other associate, in the sound eye ;
7. Advancement of the inferior oblique, one of its antagonists, in the sound eye ;
8. Advancement of the superior rectus, its other antagonist, in the sound eye.

Of these eight procedures, three must be at once rejected as impracticable, viz., 1, 5, and 7. Four others, viz., 2, 3, and 4, which are practised on the affected eye, and 8, which is practised on the sound eye, would appear on theoretical grounds to be inadmissible. Thus, the deviation produced by paralysis of the superior oblique is not neutralised by tenotomy of the superior rectus ; it is true that these muscles are antagonists both in vertical and horizontal movements, but they are associates as regards torsion movements. The same objection applies theoretically to the advancement of the inferior rectus of the affected eye. Tenotomy of the inferior oblique would meet the requirements of the case so far as vertical and torsion movements are concerned, but it would increase the inward deviation, for this muscle is the associate of the superior oblique in outward movements. Again, advancement of the superior rectus of the sound eye, while it would tend to neutralise the difference between the two eyes in the vertical direction and as regards torsion, would increase the pathological convergence.

Tenotomy of the inferior rectus of the sound eye alone meets the theoretical requirements of the case ; it aids the raising and hinders the lowering of the sound eye to match the change in the affected eye ; it slightly lessens convergence, which the paralysis slightly increases ; it produces a slight torsion parallel to that caused by the paralysis.

The rational operation, then, in every case is a compensatory tenotomy, as Alfred Graefe calls it, of the physiological

associate in the sound eye, viz., for the superior oblique, tenotomy of the inferior rectus in the sound eye. For the inferior oblique, tenotomy of the superior rectus in the sound eye. For the superior rectus, tenotomy of the inferior oblique in the sound eye. Seeing that tenotomy of the superior oblique is impracticable, a compensatory operation for paralysis of the inferior rectus is not possible.

Practical Experience.—Remembering that theoretical calculations are not always safe guides, and guided by the teaching of Landolt, that the operation of advancement succeeds better than simple tenotomy in restoring the normal movements of the eye, Epéron employed advancement tentatively in a series of cases, and with excellent results. He records six cases in detail, with charts showing the field of binocular fixation after the operation. The following epitome will indicate their nature :—

1. Traumatic paralysis of left superior oblique ; diplopia throughout the greater part of the binocular field, advancement of the inferior rectus in the affected eye ; complete cure.

2. Paresis of left superior oblique ; advancement of left inferior rectus ; unsatisfactory result due to premature removal of sutures ; advancement of superior rectus and tenotomy of inferior rectus, in sound eye ; complete cure.

3. Long standing paresis of right inferior rectus ; capsular advancement of right superior rectus ; rapid and complete cure.

4. Long standing paresis of right inferior oblique ; tenotomy of right inferior rectus ; cure of the diplopia in six weeks.

5. Slight long standing paresis of right third nerve and right external rectus ; insufficiency especially in looking inwards and in looking upwards ; advancement of right superior rectus, corrected later by capsular advancement of left superior rectus ; considerable enlargement of field of binocular fixation and improvement in the subjective condition.

6. Paralysis of left third nerve, with only slight ptosis ; outward deviation 12° , upward 5° ; advancement of internal rectus, and later of inferior rectus ; position of eye improved,

but diplopia still present, except in a small area near to the primary position.

Conclusions.—1. Vertical deviations of the eye of paralytic origin are usually of small extent—0 to 10° in the primary position—and are therefore easily amenable to operative treatment, when other treatment fails.

2. The success of operative treatment is favoured by the fact that upward and downward movements are each affected by two separate muscles, one of which usually remains active.

3. For the purposes of practical surgery we may consider the superior rectus and the inferior oblique to be allied for upward movement, the inferior rectus and superior oblique for downward movement; and conversely the superior oblique to be the antagonist of the superior rectus, the inferior oblique of the inferior rectus.

4. The effects of paralysis of the superior oblique can be completely corrected by advancement of the inferior rectus of the affected eye, or by advancement of the superior rectus of the sound eye. The former is preferable.

5. The effects of paralysis of the inferior oblique can, in like manner, be corrected by advancement of the superior rectus of the affected eye. They can also be favourably modified by tenotomy of the inferior rectus of the affected eye.

6. The compensatory tenotomy of the associated rectus in the sound eye, proposed by A. von Graefe, and later by Alfred Graefe, is uncertain in its results. In any case compensatory tenotomy of the inferior rectus should be avoided if possible, for the weakening of the downward movements of the eyes may cause troublesome asthenopia in near work which demands this position. This operation may nevertheless be a valuable auxiliary when advancement of the inferior rectus in the affected eye, or of the superior rectus in the sound eye, proves insufficient to neutralise the effect of a paralysis of the superior oblique.

7. After a little practice the effect of an advancement is more easily regulated than that of a tenotomy; it may be varied from 0 to 10°, or even more, in the primary position, by greater or less advancement of the muscle and by

earlier or later removal of the stitches; even when the immediate effect is too great, it is not wise to remove the stitches before the third day. Insufficiency is less likely to be caused by advancement than by tenotomy.

8. When the deviation is slight, capsular advancement may be employed with advantage, instead of muscular advancement.

9. Advancement is the best operation in cases of paralysis of the superior or inferior rectus, especially the latter; and in this case tenotomy of the inferior oblique by Landolt's method may be added, if necessary.

10. These operations have not the ill effect on the inclination of the cornea which might be expected. Experience shows that by facilitating the re-establishment of binocular vision a sufficient impulse is given to bring the muscles into harmonious action.

11. Experience shows also that this harmonious action is not limited to the immediate neighbourhood of the primary position, but may be restored throughout the whole of the normal binocular fixation field.

12. When a vertical paralytic deviation is associated with a horizontal deviation of similar origin, success will depend upon the possibility of curing this later. In these cases, especially, the measurement of the two monocular fixation fields aids the prognosis.

P. S.

W. RATH (Göttingen). On the Symptomatology of Tumours of the Pituitary Body (*Hypophysis cerebri*). *Von Graefe's Arch. für Ophthal.*, 1888. *Abth. IV.*, p. 81.

In this abstract of his Inaug. Dissertation, Dr. Rath relates and discusses two previously unrecorded cases of tumour of the pituitary body, and gives the result of a comparison of these and thirty-six other cases, the bibliography of which he annexes. The two cases he records are, for various reasons, somewhat incomplete. The second case possesses

the interest of having been seen at its commencement by Albrecht von Græfe, several of whose letters regarding it are quoted.

CASE I.—A corn merchant, aged 63, when admitted into the Göttingen Hospital, Nov., 1886, had been fairly well, with the exception of chronic bronchitis, till October, 1885, when he had a sudden rigor with pain in his limbs and great weakness. Soon after this attack he became sleepless, and had attacks of severe dyspnœa. After temporary slight improvement he developed L. ptosis and diplopia, and soon after this headache and vomiting, stiffness of the lower limbs, and formication of arms and legs. He passed a large quantity of urine containing no sugar or albumen, and he emaciated rapidly. Soon he developed R. ptosis, and the vision of both eyes began to fail, his mental condition remaining, however, unimpaired, and there being no other paralysis.

On admission he had double, almost complete, ptosis, double divergent strabismus with fixation of the globes in that position, pupils dilated and immobile, the L. larger than R., unaffected by homatropine. The media were clear, and he had white atrophy of the temporal half of each papilla, the nasal half somewhat pale and its edge blurred. Vessels and rest of fundi normal. V.R. Fingers 5 to 6ft. L. Fingers 2 to 3ft. He was semi-comatose, and had vomiting of cerebral type. His urine amounted to 41 oz., notwithstanding the small amount of liquid taken, 1006, no albumen or sugar. His mouth became slightly drawn to the L., and two days after admission he died comatose.

Autopsy.—A tumour occupied the position of the pituitary body, part of it, the size of a plum, destroying the sella turcica, especially anteriorly, and involving the L. carotid artery, part, the size of a cherry, invading the brain, pressing forward the chiasma, and involving the L. tract and the L. nerve, and to a less extent the R. tract and the R. nerve, both nerves, however, being still fairly plump and white. The R. third nerve was considerably larger than the L. Blood-stained fluid filled the lateral ventricles and a blood-clot continuous with the tumour anteriorly filled the third ventricle and passed through the aqueduct into the fourth. The walls of the ventricles were softened, and there was a

considerable area of softening in the floor of the posterior horn of the R. lateral ventricle, with some extravasation of blood in the area, but no evidence of neoplasm. There was an embolus in a branch of the pulmonary artery, and a secondary growth in the R. kidney. The growth was a spindle-celled sarcoma. The R. optic nerve showed a wedge-shaped area of atrophic fibres in its upper half, separated both from the periphery and from the centre of the section by healthy nerve fibres. This area became more lateral as it neared the papilla. The fibrous network showed coarse in this area, and the optic nerve sheaths and intervaginal space were infiltrated with nuclei. The L. optic nerve showed no marked change, the trabeculæ somewhat broad, the papillary tissue open, and the intervaginal nuclei numerous. Each nerve showed glandular tissue projecting from below into the substance of the nerve at the papilla.

The diagnosis of tumor cerebri was readily made in this case, and the ptosis with increasing oculo-motor paralysis and the optic atrophy, presumably consecutive to retrobulbar pressure, made the position of the tumour clear. From the absence of paralytic symptoms the tumour was presumed to be of no great size. The visual fields were not taken on account of the patient's condition.

CASE II.—A school-master, aged 51 years, in 1865 became affected with temporal hemianopsia, the R. temporal field more affected than the L., and extending into the nasal half. The L. eye could still read ordinary type, and he continued to use it for many years. Von Græfe examined him at this time and found no ophthalmoscopic changes; but gave a guarded prognosis, saying that he had seen such a loss of visual fields caused by basal lesions in the middle line, although there was no other evidence of such lesion in this case, also he had met with it in anæmia due to hæmorrhage, once in polyuria (without sugar), and once in connection with chronic gastric disease; he had seen three or four cases of complete recovery. General hygienic treatment with iron, and, later, potass. iodid. was ordered. In 1866 the ophthalmoscopic signs were still negative, except that von Græfe considered the discs paler. In 1867 there was definite

optic atrophy, and the V. of the R. eye had failed considerably. From this date, however, till 1875-6 the ocular and visual conditions remained at a standstill, and the patient had still sufficient vision for his duties, which, however, he had then to relinquish on account of mental failure. At this time the R. eye got blind and divergent, the lower limbs became feebler, and he had periods of hebetude alternating with periods of exaltation lasting sometimes for days. Headache was always slight. His pulse latterly was only 40; he became very stout, and he died in 1878.

Autopsy.—A large basal tumour, which proved to be a highly vascular round-celled sarcoma, extended from chiasma to pons. It had distended and destroyed the sella turcica and extended into the R. lateral ventricle, involving the optic nerves, especially the R. and the oculo-motors. The ventricles were distended with fluid, and the hemispheres greatly compressed.

Here the headache and, latterly, the hebetude were the only symptoms of the great pressure upon the brain, the explanation probably being that the pressure was developed very gradually throughout the thirteen years, during which at least the tumour existed. There was unfortunately no ophthalmoscopic examination during the last years of life. Dr. Rath assumes that there was at the last probably complete atrophy.

Of the thirty-eight cases collected by Dr. Rath, in five no symptoms were noted. The function of the pituitary body is unknown. Diseases, especially neoplasms, not extending beyond the limbs of the body cause no symptoms. In the other thirty-three cases, cerebral compression was indicated by headache in 82 per cent., never occipital, but otherwise not constant. Vomiting, giddiness, and epileptiform seizures were the next most common symptoms, but were comparatively infrequent. The ophthalmoscopic appearances were noted in ten cases, and there was either atrophy or papillitis in all. Neuritis is relatively often absent in this form of cerebral tumour, because Rath believes they generally kill too soon for it to occur. Bernhardt considers rather that they usually cause such pressure as to prevent the entrance of fluid into the optic sheath,

and they therefore produce a primary atrophy. Rath's second case certainly does not support his view, and Bernhardt's explanation is not really weakened by the fact that neuritis may occur quite late in the disease when there is already advanced atrophy. It is quite possible that in Rath's second case a late neuritis was the cause of the complete blindness of the R. eye. (Compare a case of Pituitary Tumour recorded by the writer *Brain*, Oct., 1886, p. 385, Abstract *O.R.*, vol. vi., 1887, p. 42, where neuritis supervened shortly before death on almost complete atrophy.)

The hebetude produced by cerebral compression was present in 30 per cent. of the cases, and Bernhardt has noted, in addition to the hebetude, a peculiar childishness with irrelevant, drawling speech. Simple sensory loss was infrequent, but formication in the extremities and pain in the distribution of the fifth nerve was not infrequent. Motor symptoms, in the form of tonic or clonic convulsions or paresis, were present in 57 per cent., especially a slight weakness of the legs in walking. Smell, strangely enough, is rarely affected, and taste also is usually intact. Hearing is more frequently affected in the form either of tinnitus or deafness. In 70 per cent. of the cases all running a rapid course, there was no neuritis or other change in the fundi, but in only one of these, and that doubtful, was the vision intact. In only three or four of the cases could the temporal hemianopsia be substantiated, but amblyopia, in some cases going on to complete blindness, was present in all. Post-mortem, the nerve sheath was found distended, or the floor of the third ventricle pressed down on the chiasma, or the visual fibres were directly involved, generally on the left side. In five cases there was actual disease in the fundus, of which three showed optic atrophy. The oculo-motor nerves were next most frequently involved, causing inequality of pupils, ptosis, and divergent strabismus. The sixth was affected in four cases.

Diabetes mellitus was present in three cases, diabetes insipidus in one. Were these produced by the tumour? Rath notes that diabetes insipidus has been found in conjunction with temporal hemianopsia where no autopsy was

obtained, and he considers that the association of the tumour and the urinary affection is that of cause and effect, probably through the hydrops ventriculorum, or perhaps from injury to other "diabetic centres." The duration of the disease may be from a few days to fifteen years or more. The tumour is most frequently sarcomatous.

Rath sums up his conclusions as follows :—Tumours confined to the pituitary body are necessarily undiagnosable. Tumours extending beyond the limits of the pituitary body, *i.e.*, tumours of the pituitary region, cause frontal and temporal headache extending into the orbits, early affection of both eyes, often successively, with an amblyopia in the form of temporal hemianopsia, ophthalmoscopic appearances at first negative, in later stages optic atrophy, strabismus, hebetude, and weakness of legs. Corroborative is the frequent absence of sensory and motor disorders, and the presence of a peculiar form of dementia or of diabetes mellitus or insipidus.

J. A.

MITVALSKY (Prague). Dermoid Tumours of the Eyeball.

The author of this paper, which is published in Czechish, with a *résumé* in French, describes two cases of congenital tumours of the cornea, which had come under his care in Schöbl's *clinique*. He has also looked up the literature of the subject, and refers to all the published cases which he thinks can strictly be called dermoid tumours of the eye ; these he defines as "tumours or congenital formations exhibiting a structure like that of the skin, and growing from the anterior half of the eye." Clinically, he divides all cases into two groups ; in the first, which he proposes to call "typical dermoid" tumours, are included the cases in which the growth is "free," while the second group contains those cases in which the tumour is anatomically connected with the eyelid, and which he names "atypical." Of the recorded cases, 75 in number, 90 per cent. belonged

to the first group, and in the great majority of these the growth was situated at the sclero-corneal junction, by which it was divided into two nearly equal parts. In a few cases (5 out of 68) the tumour was entirely corneal, and in others (12 cases out of 68), it was situated wholly on the sclerotic. The relation of these growths to the conjunctiva varied: in some the conjunctiva appeared to be replaced by the tumour tissue, in others it covered the surface of the latter, while in most instances a portion of the growth was apparently covered by conjunctiva, while the remainder exhibited on its surface a pavement epithelium, papillæ, hair follicles, and fine hairs. Sebaceous glands were frequently found in the specimens, sudoriparous glands very rarely. Of the 68 cases in the first group, 70 per cent. presented no other congenital anomaly. In a few instances the only representation of a tumour was a hair, in the usual site of the growth. The second group—the atypical dermoid tumours—included 10 per cent. of the whole number collected; they naturally fell into two sub-groups, according to the normal or abnormal development of the eyelids. In a certain number of cases congenital coloboma of the lids co-existed. The cystic form, or closed dermoid, is never met with in the eye.

Mitvalsky's two cases, which are well illustrated by plates, are briefly as follows:—

Case 1.—A female child, æt. 6 years, on the cornea of whose left eye there was a raised white patch, obscuring the pupil almost entirely. Its transverse diameter measured 5 mm., its thickness 2 mm. At no point did the new growth reach the sclero-corneal junction. It was of soft consistence, its surface smooth and glistening, and with a magnifying lens a fine network of superficial blood-vessels, derived from those of the conjunctiva, could be made out. After removal, a small semi-opaque patch remained. Histologically, the tumour consisted of interlacing bundles of fibrous tissue, beneath which was a thin layer of fat. Its surface was covered with an epithelium closely resembling that of the cornea; in sections, a large number of vessels cut transversely were seen, surrounded by lymphatic spaces, lined with endothelium. There were no hair follicles or

glands. By means of acetic acid it was easily demonstrated that the interlacing bundles consisted of elastic and fibrous tissue. The eye was in other respects normal.

Case 2.—A male child, aged 20 days, whose right eye was nearly covered by a congenital growth, which occupied almost the whole cornea, only a small crescent of which was visible at the lower margin. The tumour consisted of a corneal and a scleral portion; the corneal part was of a reddish-yellow colour, with a dull surface; the scleral part was covered by thickened congested conjunctiva, the former being adherent, while the latter was movable. No hairs were visible. The parents declined operation at the time, but in two months returned, asking that something might be done. The tumour in the meantime had increased considerably, and fine hairs had grown on the corneal portion, some of which, at the upper part, measured one centimetre in length. The growth was easily removed, and after the operation it was seen that only the deeper layers of the cornea, next Descemet's membrane, were left; they were nearly transparent. The growth measured, after removal, 1.5 cm. in length, 1 cm. in width, and 0.5 cm. in thickness. Microscopically, it consisted of an epithelial layer, a thick layer of fibrous and elastic tissue, and beneath this some loose tissue, the meshes of which were filled with fat. The fibrous stratum contained numerous hair follicles, and sebaceous glands, sudoriparous glands being present in a few of the sections. This layer, the author thinks, corresponded to the corium, and showed numerous well-developed papillæ. The epithelial layer exhibited the characters of epidermis. The scleral part of the tumour was composed of a fibro-lipomatous tissue. Lymphatic spaces were present, but there were no nerves.

J. B. L.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, JUNE 13TH, 1889.

J. W. HULKE, F.R.S., President, in the Chair.

On Apparent Movement of Objects Associated with Giddiness.—Dr. Beevor read this paper, and began by defining giddiness as: (1) the apparent movement of objects in definite directions; (2) the sensation of the person himself moving round, or (3) both sensations combined. In certain cases of epilepsy giddiness had been observed as an aura, and in the large majority of these cases the apparent movement of the patient and of objects round him were in the same direction, and generally corresponded to the direction of initial rotation of the head in the fit. In auditory vertigo, in most cases, the apparent movement of the patient was in the opposite direction to that of objects round him. With the actual movement of objects before the eyes, giddiness was produced, as in the case of a waterfall, but, when the gaze was directed away from the water, only that part of the retina perceived secondary after-movements which was acted on by the image of the fallen body; the after-movements were always in the opposite direction to the real movements. If the eyes were fixed, giddiness was not produced, but the secondary after-movements were, and the author thought it highly probable that the latter could be produced by a complementary sensation of movement in the rods and cones of the retina which had become exhausted by the continued movement.

Dr. Collins said that Dr. Beevor's views were in opposition to those taught by Helmholtz and other writers up to the present date.

Dr. Beevor, in reply, said that, while he did not deny the correctness of Helmholtz's views, he was unable to explain thereby how a strip of the retina only could be affected by after-movements, and not the whole field of vision. Helmholtz stated that if the eyes were fixed no giddiness was

produced by the appearance of moving objects ; but this did not tally with Professor Thompson's experiments with two oppositely rotating discs, to which Dr. Beevor referred.

On Some Forms of Traumatic Keratalgia.—Dr. Bronner (Bradford) read a paper on this subject, and reminded the Society that Dr. Grandclement had drawn attention to the affection at the Ophthalmological Congress in Paris in 1888. The peculiar feature of these cases was the severe pain resulting from a very small wound of the cornea, which pain recurred usually in the mornings, and often persisted for several months. He read notes of some cases, in one of which the pain lasted for eight months, and was so intense that the patient wished to have the eye removed. Relief was obtained by excision of a small macula at the site of the wound. In another case the pain continued for two years. The author suggested, as treatment for these cases, the use of hot fomentations for several weeks, followed by massage with yellow oxide of mercury ointment. If these remedies failed, the excision of any cicatrix resulting from the wound should be tried.

Mr. Brailey suggested that the cases might be in a measure hysterical, though the presence of a corneal cicatrix showed that some structural change had occurred.

The President remarked that the pain and other symptoms were frequently more severe in superficial injuries of the cornea than in deep wounds, possibly because in the former a large number of the extreme terminations of the nerves were lacerated. In most cases where there was removal of epithelium, if the eyeball were fixed, the epithelium rapidly reformed, but in a few the pain persisted apparently after the wound had healed.

Dr. Collins thought all the cases of superficial injury to cornea got well if treated with rest and atropine.

Mr. Jonathan Hutchinson, jun., referred to Dr. Bronner's suggestion that a chemical irritant might be present, and mentioned the case of a boy who injured his eye with a steel pen nib and ink-stained the cornea. Pain persisted for a long time in spite of careful treatment.

Mr. Nettleship had long been familiar with cases in which a simple abrasion of the cornea appeared to relapse

after a considerable interval of time, and suggested that in these instances the epithelium had not undergone vigorous repair, and the scar easily broke down again. He asked Dr. Bronner if the destruction of the macula on the cornea by means of the galvano-cautery might not be as efficacious as excision of the scar.

Penetrating Wound of the Globe with Eyelash in the Anterior Chamber.—Dr. Collins read notes of this case, occurring in a man aged 44. The injury was caused by a knife-thrust. A sclero-corneal wound resulted, with prolapse of iris; and when the patient was first seen, forty-eight hours after the accident, a cilium was observed lying on the anterior surface of the iris; this was removed without difficulty with a Tyrrell's hook and iridectomy forceps. Rapid recovery ensued, and a month later $V = \frac{5}{14}$ and 1 J. with correction. Three similar cases had been recorded by Messrs. Rockliffe, Power, and Couper.

On the Light Sense in Optic Neuritis.—Mr. Berry (Edinburgh) communicated this paper, which was read by the Secretary. Four cases of double optic neuritis from cerebral disease had been examined. In all the acuity of vision was normal, and when tested with Bjerrum's types no light-difference defect was discovered, although the changes seen at the optic papillæ were very pronounced. This fact established a distinction between cases of ordinary optic neuritis and of retro-bulbar neuritis, which was suggestive of different alterations in the nerves in the two diseases. The author suggested that in cases of neuritis or atrophy, in which considerable amblyopia was present, with relatively good light-difference appreciation, there was a complete, or almost complete, interruption in the conductivity of a number of the fibres, co-existing with a perfect, or relatively perfect conductivity of others. On the other hand, where there is an uniform lowering of the conductivity of the fibres, a diminution in light-difference appreciation would precede and accompany the amblyopia.

On a Case of Subconjunctival Cysticercus.—Mr. Gunn, for Mr. Werner (Dublin), read notes and exhibited drawings of this case. The patient was a lad aged 7, and on depressing

his right lower lid a smooth ovoid semi-translucent cyst was exposed, the size of a large pea, and of a reddish-yellow colour. It was situated between the sclera and conjunctiva, and was freely movable under the latter. When examined by focal light, a small opaque circular spot was visible, near the centre of its anterior surface, which cast a shadow in the interior of the cyst. After removal, which was accomplished without difficulty, the microscope revealed in the interior of the sac the head and neck of a bladder-worm, with four suckers and a circle of thirty hooklets, large and small, to which succeeded a much wrinkled neck, sprinkled over with the usual calcareous corpuscular particles. Measurement of the hooklets and the appearance of the walls of the vesicle proved the parasite to be *cysticercus cellulosæ*, the cystic stage of *tænia solium*.

Card Specimens.—The following patients and card specimens were exhibited :—Dr. Collins : Case of Coloboma of Iris and Choroid in each eye ; Dr. Rockliffe : Peculiar Condition of the Crystalline Lens ; Mr. Treacher Collins : Microscopic Sections of a Choroidal Neoplasm, presenting structural peculiarities ; Mr. Prince : Congenital Tumour of the Cornea ; Mr. Hartridge : Peculiar Appearance of the Macula ; Mr. Lawford : Tertiary Syphilitic Ulceration of Conjunctiva.

OPHTHALMOLOGICAL SOCIETY OF FRANCE.

We have been requested by the Secretary of the SOCIÉTÉ FRANÇAISE D'OPHTALMOLOGIE to inform our readers that the annual meeting will be held in Paris, on August 8th and following days, at the Hôtel des Sociétés Savantes, rue des Poitevins. The following is the provisional list of papers :—

DR. DE WECKER. Remaniement des procédés classiques de l'extraction simple.

DR. NUEL. Des mouvements de la pupille.

DR. JAVAL. Communication sur l'Ophtalmométrie.

DR. ABADIE. Des diverses formes cliniques de l'Ophtalmie sympathique.

- DR. DRANSART. Contribution à la pathogénie de certaines amblyopies et atrophies du nerf optique d'origine rhumatismale.
- DR. PARINAUD. Traitement du strabisme.
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CONGENITAL MALFORMATIONS OF THE EYEBALL AND ITS APPENDAGES.

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LECTURE II.*

To-day I have to continue the account of malformations of the eyelids.

Ectropion, or eversion of the edges of the eyelids, is very rare as a congenital condition, and seems always to be accompanied by ocular mal-development, usually in the form of buphthalmos or megalocornea.

Entropion is much more frequent, though also rare, the lower lid being the one affected. A *slight* inversion seems to be the normal position of the lids shortly before birth. We occasionally find this condition associated with epicanthus, a congenital peculiarity shortly to be mentioned. The irritation produced by the inverted lashes in these congenital cases is comparatively slight. The entropion is described as being self-curative, but I think this tendency has been exaggerated. Some cases, doubtless, do improve or disappear as the eyeball and orbital margin grow, but in extreme examples operative treatment will sooner or later be called for.

Congenital entropion has also been described as sometimes accompanied by trichiasis, and as evidently

* Delivered at the Hospital for Sick Children, Great Ormond Street, on May 14th, 1889.

the result of an intra-uterine inflammation. I have seen no such cases; but, if they are met with, the same operative treatment will be required as is in a similar condition in the adult.

Anchyloblepharon is an adhesion of what ought to be the *free* margins of the upper and lower lids. Several cases of this affection have been recorded in infants. In some of them no eyelashes were present, and in the situation of the intertarsal slit there was merely "a narrow sulcus, lined by a delicate vascular portion of skin, which admitted of extension, but not of absolute separation."*

In one case a curious partial anchyloblepharon was found, in the form of a small filamentary portion of integument at the junction of the outer and middle thirds of the lids. A narrow palpebral aperture, usually the result of a partial anchyloblepharon at the outer canthus, accompanies microphthalmos.

The explanation of anchyloblepharon often given is the persistence of a developmental condition, in as far as several observers describe the lids as closed at an early stage of foetal life by a vascular and membranous connection. Others, again, account for it by an intra-uterine inflammation affecting the edges of the lids during their closed state.

Symblepharon, an adhesion of the lids to the globe, has also been observed, but is exceedingly rare; in fact I do not know of a single case having been met with in this country.

Normal differences in the size of the palpebral aperture exist in different individuals, and are frequently the cause of what are called "small eyes" and "large eyes." Such differences are characteristic in certain races, giving the almond-shaped or elliptical eye of the Chinese, and the small eye of the American Indian.†

* Middlemore.—"Treatise on Diseases of the Eye," vol. ii. p. 842.

† See Wilde—"Malformations and Congenital Diseases of the Organs of Sight," pp. 18, 19.

Lagophthalmos is a name somewhat loosely applied, but here I mean a rigid contracted state of the eyelid, preventing complete covering of the globe, and that independently of any paralysis of the orbicularis muscle. Its causation has not been explained. Fortunately it is a very rare affection, for its treatment is unsatisfactory.

Epicanthus is by no means an uncommon peculiarity. It consists in the existence of a loose crescentic fold of skin on either side of the nose, hiding the caruncles, and sometimes even the inner corneal margin, and then giving rise to an appearance simulating convergent strabismus. The condition improves as the nasal bridge develops, and may disappear in this way. But if not, the deformity can readily be removed by operation.

Malformations of the Cornea.—By far the most striking instance of this is a condition of corneal haze, which may exist over the whole or only over part of the cornea. When partial, it is said to be usually limited to the peripheral region. I have myself met with one example, in the case of an infant seen at Moorfields some years ago. Both corneæ were milky white all over, but smooth superficially, the appearance being therefore that known as interstitial haze. The iris could not be seen properly, on account of the depth of the opacity. The infant was very young when brought to hospital, and the mother's account was that the child was born with its eyes so. I cannot now recollect whether or not I ordered any local treatment. If I did, it would almost certainly have been yellow oxide of mercury ointment, but the ultimate result was that the corneæ slowly cleared. From the history of other such cases this result would have been obtained without any local treatment, so it is unimportant to consider this question. In fact, the favourable prognosis is the chief importance of this class of cases, for no such clearing occurs in any other corneal opacity, except, perhaps, in some cases of interstitial keratitis. The diagnosis of congenital opacity can only be arrived at with caution: there is no increased vascularity of the

eye, and no mucopurulent conjunctival discharge. These cases have been attributed to an arrest of development at the stage when the cornea ought to become transparent. In cases where no other congenital arrest is present, however, I am inclined to think that the cause is rather to be sought in a true intra-uterine interstitial keratitis. As favouring this view we have the fact that this form of infantile corneal opacity has been observed in several members of the same family.

Other congenital corneal opacities have been recorded which are manifestly the result of intra-uterine disease, *e. g.*, staphyloma with anterior synechia,—and very probably some of the cases of microphthalmos are the result of extensive sloughing of the cornea.

Occasionally infants have a distinct semi-opaque arcus, sometimes quite like the usual *arcus senilis*, but the peripheral clear edge is not always found. It is such cases, probably, that, when exaggerated, give rise to the condition known as microcornea, where the cornea is too small for the rest of the globe. Such a small cornea is generally not quite round, but is often oval in shape, with a ragged border.

Like all other tissues, the cornea normally varies much in its development in different individuals, both as regards its superficial extent and as regards its thickness. Sometimes, the superficial area is increased, while the tissue itself is thin, giving rise to the condition called *cornea globosa*. Here the cornea is often much too large for the rest of the eyeball, but quite transparent; it is strongly domed, but the curve is easily altered by slight localised pressure, on account of the thinness of the tissue. The anterior chamber is very deep. The optical result in an otherwise normal globe is myopia, *viz.*, that form recognised as corneal myopia.

In other cases an unusually thin cornea tends to yield chiefly towards its centre, and we have gradually developed the condition known as *conical cornea*. This is probably, as Wilde suggested, more often congenital

than is suspected, though it is only after some years that the conicity becomes so marked as seriously to interfere with vision. Again, and very frequently, the corneal dome is not uniformly curved, giving rise to astigmatism.

Malformations of the Iris.—Total absence of the iris, or *Irideræmia*, naturally first claims our attention. The appearance is like that of a very widely dilated pupil, the whole corneal area being extremely dark, with sometimes, however, a slight milky haze, from corneal opacity. On closer examination no vestige of iris can be observed. The ophthalmoscope gives a wide red reflex, not infrequently broken by a darkish ring near the periphery of the lens, the circumference of the latter, however, remaining easily traceable all round. The lens is occasionally cataractous. Sight is always defective, and there is often nystagmus. The influence of heredity is strongly marked in this affection, so that there are frequently several members of one family exhibiting the same peculiarity. Occasionally, traces of the outer periphery of the iris are discernible, though not sufficient to assist visually, and we then call the condition "partial irideræmia." It is manifestly an arrest of development, and is probably to be explained by delay in the normal separation of the developing lens from the part of the cuticular epiblast forming the surface of the cornea, so that there is no room for the intrusion of the mesoblast in this situation to form the iris. The corneal haze may be accounted for in the same manner.

A very different partial presence, or rather partial *absence* of iris, from that last mentioned, is that constituting *coloboma*. All degrees of coloboma iridis exist, from a mere notching of the pupillary edge, to a complete gap of considerable width, but its situation is always the same, viz., below or down, and slightly in. This abnormality is comparatively common, and is popularly known in this country as "dropped pupil." Still more common is an inequality in pigmentation affecting this lower segment of the iris only, a pseudo-coloboma.

Coloboma of the iris is frequently associated with a similar condition of other parts developed from the mesoblast in the position of the fœtal choroidal cleft, so that we may have coloboma of the iris, ciliary body, choroid, and optic nerve sheath.

While in irideræmia and coloboma there is a deficiency of iris-tissue, in the next form of mal-development, viz., *persistent pupillary membrane*, the iris is well developed, and has superfluous tags left representing the old vascular membrane that has fulfilled its work and has not undergone complete absorption. This condition is carefully to be distinguished from posterior synechiæ from an old iritis, by the appearance and by the manner of attachment of the shreds of tissue. In persistent pupillary or capsulo-pupillary membrane, the tags are coloured, in part or whole, like the iris-stroma; and they are attached, by one or both ends, to the anterior surface of the iris some way out from the edge of the pupil. Posterior synechiæ, on the other hand, are greyish-white in colour, or almost black if covered by uveal pigment, and are attached to the iris at its pupillary edge by one end only. Old posterior synechiæ, causing the pupil to be very small and closely bound down to the lens capsule, may also exist as a congenital condition, due to an intra-uterine iritis. Cases of congenital myosis or *microcoria* are, in fact usually, I believe, the result of posterior synechiæ from this cause.

It is very common to have the pupil slightly eccentric and every now and again this malposition is so considerable as to be easily remarked on a mere casual examination. As a rule, the displacement is in a direction up and out. The probable explanation, where no adhesions exist, is that the opposite section of iris is underdeveloped, and that it is, in consequence, stretched by the better developed muscle existing in the upper limb. This malformation is known as *corectopia*.

The term *Dyscoria* is applied to congenital irregularities

in the shape of the pupil, and many varieties have been figured. Some of these are manifestly the result of intra-uterine iritis. *Polycoria*, or plurality of pupils, is little more than a form of irregularity, and the second pupil is the result of a bridge of healthy iris-tissue, or of persistent pupillary membrane. Tremulous iris, *Iridodonesis*, is sometimes congenital, and is commonly found in cases of buphthalmos. When present without the latter deformity it is probably due to the iris being abnormally thin and to the fact of its outer periphery being inefficiently attached to the cornea. Such eyes are not uncommonly myopic.

Occasionally we find in children a small pupil which dilates imperfectly, but regularly, under a mydriatic. Such a condition is not uncommon in association with congenital cataract. The development of the sphincter, or its innervation, is here apparently at fault.

I have quite recently met with a case, which I may just mention here, where the inner, or sphincter third of the iris was situated altogether posteriorly to the outer two-thirds, and, as far as could be seen, was only attached to the latter by narrow bands. The inner portion was, in fact, almost free, and nearly disappeared behind the outer part on dilatation of the pupil.

At birth the iris is of a light greyish-blue colour, and the stromal pigment is developed subsequently. Instead of this pigmentation occurring uniformly and simultaneously over the entire iris, we may only have segments of it coloured, the remaining segments undergoing little or no change. In this manner we get the condition of *Piebald Iris*. Sometimes this may, perhaps, be merely a temporary condition in young children, the lighter patches ultimately becoming normally pigmented; thus in one or two cases of piebald iris, the mother has told me that other children of hers presented a similar appearance at one time, though no trace remained. I have never, however, actually followed such a case. The peculiar segmented distribution of this irregular pig-

mentation of the iris suggests the probability of some abnormality of innervation being the cause.

Occasionally the entire iris is uniformly pigmented, but of a different colour in the two eyes. In the one eye, for example, it may be grey, and in the other brown. I have almost invariably found that, in cases of this sort where both eyes were otherwise normal, the one corresponded in colour to that of one parent, the other to that of the other parent. Sometimes, as was I believe first pointed out by Mr. Jonathan Hutchinson, the lens is cataractous in one eye of these cases. The cataract here is probably usually congenital, but occasionally I consider it is traumatic, though there be no history of injury. In one or two examples of this nature I have, on close examination, detected a minute scar on the cornea of the cataractous eye, and the difference in pigmentation may here have been the result of a slight iritis from wound of the iris, not sufficient to cause posterior synechiae, but, nevertheless, occasioning alteration of pigmentation at this period of life. Such a wound may readily be caused in an infant in arms by the point of a pin projecting from the mother's dress; the child doubtless cries at the time, but nothing is observed amiss, the cornea soon heals, and there is no knowledge on the mother's part of what has occurred.

In *Albinos* the iris is light in colour, from the absence of pigment both in its stroma and in its posterior epithelial layer. The whole uveal tract and the retinal pigment-layer are similarly affected, and there is consequently a pink reflex through the pupil in ordinary daylight, from light passing into the interior of the eye through its coats, and from the absence of the normal absorption by the retinal epithelium. The eye itself is usually nystagmic, in consequence of the vision being imperfect. The eyelashes are long and white; indeed, as you are well aware, there is a general want of pigment in such individuals, particularly evident in their hair, which is fine, and almost, if not quite, white. I

have recently, however, seen an exceptional case at Moorfields, a lad whose hair and eyebrows were dark brown, and rather coarse, while his eyes and eyelashes presented the usual albinotic appearance.

Malformations of the Retina and Choroid.—As I have just stated, the normal pigment of the choroid and retina is absent in albinos. We recognise this condition ophthalmoscopically by the general brightness of the red fundus-reflex, by the absence of stippling, and by the distinctness with which the choroidal circulation is visible. Accurate examination is usually rendered somewhat difficult on account of the associated nystagmus, and often by the presence of considerable photophobia as well. Short of complete albinism, there are many cases of imperfect pigmentation of the retinal epithelium and of the choroid, just as we find in the iris.

Coloboma of the Choroid is often associated with coloboma of the iris, and is found in a corresponding part of the globe, viz. below. Ophthalmoscopically we recognise it as a large whitish area on the lower part of the fundus, often bordered by black pigment. The shape of this area is more or less pyramidal, the blunt apex turned towards and perhaps reaching the papilla, while the base is directed towards the equator of the eye and sometimes extends forwards beyond the reach of ophthalmoscopic examination. This white area is often markedly excavated, and on its floor we see large tortuous vessels which are connected with the deep vessels of the neighbouring choroid. Varieties of this condition are found, but I need not further particularise them now. Suffice it to say that occasionally the coloboma extends so far backwards as to involve the sheath of the optic nerve, and that then the central retinal vessels enter the eye irregularly, and chiefly well below the optic nerve-entrance.

In a gross case of coloboma we have a gap in the iris, in the ciliary processes, and in the retina, and have the choroid practically unrepresented below, while the

optic nerve-sheath is unclosed in this situation, and the sclerotic is thin and bulging. In addition we get a notch in the lower edge of the lens, and sometimes also in the vitreous, and all these mal-developments occur in the position of the foetal choroidal cleft.

I would explain this condition in the following manner:—The process of mesoblast, which finds entrance at the choroidal cleft, corresponds in position to the gap between the fronto-nasal process and the upper division of the first branchial arch. A premature closure of the deep parts of this gap (the oblique facial cleft) would probably cause the supply of mesoblast in this situation to be cut off, so that there would not be sufficient to complete the formation of the iris, ciliary body, vitreous, choroid and sclerotic. The tendency that naturally exists in the edges of the cleft in the optic cup to come together, would thus be counteracted, partly by the failure of the completion of the choroid and sclerotic at this part (such completion probably normally associated with a *contraction* of these tissues such as would assist in narrowing the cleft), partly by the intra-ocular tension causing a bulging of these thin imperfectly-formed tissues, so as really to widen the gap already existing. The notch in the lower border of the lens may be accounted for by the imperfect development of the ciliary processes and suspensory ligament at this part, so that the soft lens is not here drawn outwards into its normal comparatively sharp curve at its equator.

(To be continued.)

NOTE ON THE ACTION OF THE AQUEOUS ON LENTICULAR SUBSTANCE.

By R. MARCUS GUNN.

In an anonymous article written some years ago I made the suggestion that the cause of traumatic cataract was to be sought in the action of the chloride of sodium of the aqueous on the globulin of the lens. Since then I have been in the habit of teaching further that the solution of cataract after wounds or punctures of the anterior capsule was due to the fact that globulin was normally soluble in weak solutions of chloride of sodium such as we have in the fluid of the anterior chamber.

I am induced to bring this imperfect note before the readers of the *Ophthalmic Review*, by the belief that this explanation is not generally recognised or taught in our text-books on ophthalmic surgery, and in the hope that some one better qualified than myself may further investigate the subject.

M. STRAUB (Utrecht). On the Equilibrium between the Tension of the Tunics and the Pressure of the Intra-ocular Fluids. *Von Graefe's Archiv.*, Vol. 34, Part 2, p. 52.

Of the several tunics of the eye the sclera is usually supposed to be the one which provides an effective resistance to the intra-ocular pressure. Straub disputes this position. He maintains that this pressure is chiefly supported by the uveal tunic, and on this fundamental idea bases various pathological hypotheses. We believe the idea to be erroneous, and, as the questions at issue are of importance, we propose to state the various steps in his argument and then to point out what appear to be its weak points.

There are in the body, two different elastic elements, the elastic tissue commonly so called, and the muscular tissue, of which the latter takes the higher rank by reason of its contractile power, its superior innervation and blood supply. Henle asserted as a general law that nature never entrusts to the ordinary connective or elastic tissues the duty of providing an unfailling resistance to tensile force ; she entrusts this duty always to muscular tissue. In all the hollow organs of the body there is a muscular tunic, consisting of longitudinal and circular fibres, which serves to contract the organ and to bear the pressure of its contents. Straub finds an analogous arrangement in the muscular fibres of the uveal tract.

Donders pointed out that the choroid has a certain tension of its own. When an incision is made completely through the tunics the choroid retracts, leaving bare the lips of the sclera, and this proves that the choroid has a certain power of mobility in relation to the sclera and a certain tonicity of its own.

In order to test the resistance offered by the choroid, Straub experimented on living rabbits, under morphia and chloroform. Having connected an injection canula and manometer with the vitreous chamber, he made a window in the sclera, leaving the underlying choroid intact. He first established the fact that in order to rupture the exposed choroid it was necessary to exert a pressure about three times greater than that in the normal eye. In the next place he carefully observed the bulging of the exposed choroid under different internal pressures. He found that the bulging varied in amount according to the position of the scleral aperture ; when the aperture was situated between two points at which the choroid is firmly bound to the sclera, viz., between the corneal margin and the perforation point of one of the vortex veins, then, its displacement being prevented by these attachments, the choroid hardly bulged to a perceptible degree under 30 mm. of mercury ; in situations where its displacement was not limited in this way, it bulged considerably, even under a lower pressure. The size of the aperture made in the sclera is not stated. From these observations Straub concludes

that the choroid is able to support the normal intra-ocular pressure without loss of its normal curvature, and that in the living eye it does actually bear the greater part of that pressure.

Satisfied as to this point, he proceeds in the next section of his paper to inquire what is the function of the sclera, and whether it supplements the choroid in resisting the intra-ocular pressure. Schulten has proved by experiment that the extensibility of the ocular wall rapidly diminishes under a rise of pressure, and is extremely small under a pressure slightly exceeding the normal. But, according to Straub, this high resisting power is not permanently maintained under high pressure; in evidence of this he notes that several blind eyes in which Wahlfors found a pressure of 70 mm. of mercury, proved on excision to be distended beyond the normal size. He argues that the function of the sclera is to resist those temporary increments of internal and external pressure which are caused by vascular changes and by the contraction of the ocular muscles. He admits, however, that as the sclera lies close against the choroid, it is probable that it ordinarily bears a small portion of the intra-ocular pressure.

In the next section he notes the fact, originally pointed out by Donders, that when the eye-ball is divided by an antero-posterior section, the anterior two-thirds of the choroid, together with the ciliary muscle, commonly separates from the sclera—a phenomenon clearly referable to the tonicity of the ciliary muscle.

Carrying his idea still further, Straub proceeds to consider the influence which the tonicity of the uveal tract exerts upon the circulation of blood and lymph in the eye. He describes the uveal tract as splitting anteriorly into two parts, the iris and the membrane of Descemet, the latter being the continuation and, in a certain sense, the tendon of the ciliary muscle. Hence, he argues, contraction of the ciliary muscle renders tense the membrane of Descemet, takes the intra-ocular pressure off the cornea, and facilitates the circulation of lymph through its substance.

A further effect of contraction of the ciliary muscle is to extend the fibrous mesh-work which separates the anterior

chamber from Schlemm's canal, to relieve the pressure upon the latter, and thus to promote filtration outwards.

Passing to the posterior third of the eye-ball, Straub points out that the tonicity of the choroid appears to be less effective here than elsewhere in, protecting the sclera from the intra-ocular pressure ; also that the support given by the external muscles is smaller here than further forward. The changes in this region which characterise myopia, he would, to a certain extent, explain by three differences. With regard to the lamina cribrosa of the optic disc which has no muscular support, either internal or external, he makes a curious suggestion : The law which says that the hydrostatic pressure of fluid in a closed vessel is equal in all directions does not apply, he thinks, to this part of the eye ; for fluid finds an outlet through the optic disc, and in the neighbourhood of an outlet the pressure is diminished or absent ; hence the same resisting power is not required in the disc as elsewhere. Has our author tried to calculate the amount of pressure which would be taken off the disc by the slow escape of a minute quantity of fluid along the lymph spaces surrounding the central vessels ?

The last three sections of the paper deal more particularly with the anterior two-thirds of the choroid and the ciliary muscle. The tonicity of this portion lowers the pressure in the perichoroidal space, and places the ciliary nerves and the vortex veins to a large extent beyond the influence of the pressure of the vitreous body. This protection makes it possible for the blood pressure in the veins to be lower than the intra-ocular pressure. Loss of this protection causes the group of obstructive changes which constitute glaucoma.

With regard to the ciliary muscle, Straub makes an important suggestion as to its probable action in bringing the growing eye to the condition of emmetropia and keeping it in that condition. In the young child the eye is usually hyperopic ; during the period of early growth it commonly attains, and then for many years maintains, the emmetropic condition. Is this change to be explained by an accurate adaptation of the length of the globe, of the curvature of the cornea, of the refractive index of the lens substance, or of the form of the lens ? The last-named factor alone is

directly under nerve influence, and therefore affords the most reasonable explanation of the adaptation in question. If the general form of the eye is such as to bring its refraction within a short distance of emmetropia, then the ciliary muscle may, by gradual adaptation of its own structure and that of the lens, permanently correct the remaining error; if the fault in the form of the eye is greater than can be neutralised by such adaptation, there will be a permanent ametropia.

From this hypothesis, which is certainly reasonable, Straub proceeds to another which is, we think, very much the reverse. Hyperopia appears to be a permanent condition in many of the lower animals; in them the adaptation above described does not take place. This seems to indicate, says Straub, that these animals do not accommodate; they suppress their diffusion circles only by contraction of the pupil; only for the higher purposes of man does this muscle assume an accommodative function—a strange inference, seeing that a perfect accommodative mechanism, closely resembling that of the human eye, is found in the animals in question! The present writer has proved the occurrence of accommodation in the eye of the rabbit, by means of galvanism and the phakoidoscope. (*Brit. Med. Journ.*, Dec. 6, 1873).

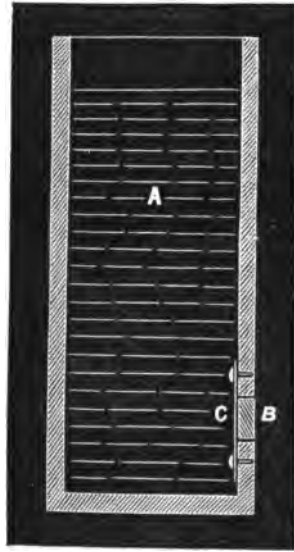
Finally, Straub propounds the following theory of glaucoma: The essence of glaucoma is a loss of tonicity in the choroid. In a previous paper he pointed out (Von Graefe's Arch. 34, 3, 1888) that in eyes blinded by glaucoma and excised the choroid does not retract when the eye is bisected, as it does in the healthy eye, and, inasmuch as this diminished tonicity was met with in one case in which the increased pressure had been of short duration and had not excavated the disc, he argues that it is the starting point of the glaucoma process. In consequence of insufficient tonicity in the choroid, the nerves and veins in the perichoroidal space are subjected to undue pressure; the compression of the veins obstructs the flow of blood, raises the pressure in the capillaries, and consequently that in the chambers. When the pressure reaches a certain height there follow passive hyperæmia in the anterior ciliary veins and other signs of inflammatory glaucoma so-called; when

it becomes higher still, rupture of vessels—hæmorrhagic glaucoma—results. The loss of tonicity in the choroid, depends chiefly on failure of its muscular elements, and evidence in support of this view is found in the special predisposition of hyperopic eyes, and of elderly persons, in the production of glaucoma by mydriatics, and in its cure by myotics.

Dr. Straub's theory of glaucoma is certainly ingenious and is supported by a coherent line of argument ; the question is whether his fundamental idea of the function of the choroid is true or false. It is certainly true that the anterior portion of the choroid supports, during contraction of the ciliary muscle, a certain amount of pressure from within which would otherwise fall upon the sclera ; this is necessarily involved in the act of accommodation as explained by Helmholtz. Moreover, as Straub points out, the tension of the choroid is proved by its retraction and partial separation from the sclera when the eye is divided. But *how much* pressure is taken off the sclera in this way ?

The analogy which our author draws between the muscular constituents of the uveal tunic and the muscular coats of other hollow organs is by no means satisfactory. The dictum of Henle, as quoted by Straub, we should venture to dispute, for it is certainly not the fact that the duty of resisting tensile force is always entrusted to muscular rather than to fibrous and yellow elastic tissue. An unfailing resistance is nowhere of more importance than in the aorta, and here the muscular element is almost entirely absent. The ligamentum patellæ, and indeed the tendons and insertions of many other muscles, might be cited as instances in which tension is borne by white fibrous, unsupported by muscular, tissue. In most of the hollow organs, *e.g.*, the stomach, intestine, bladder, and smaller arteries, variations of size and active pressure on the contents are required, and it is to this end, and not for the purpose of passive resistance, that these organs have muscular tunics. In the eye, as in the aorta, constancy and not variation of size is the requirement, and analogy would lead us to expect a non-contractile fibrous wall rather than a muscular one.

Passing to Straub's own experiments, we must point out that they prove little, if anything, concerning the actual tension of the choroid in the living eye. A simple physical experiment will show where the fallacy lies. Let A be an



upright vessel containing water, and having at one side near the bottom a round aperture accurately filled by the piece B. Let C be a piece of membrane laid over the aperture internally, and held in position by three or four pins round its margin. Now, assuming that the membrane is perfectly flexible, the wall of the vessel where it is covered by the membrane is subjected to precisely the same pressure as though the membrane were absent. If the piece B be now removed the pressure on this area will have to be borne by the membrane. If the membrane is highly extensible it will bulge out through the aperture; if it is practically inextensible, and firmly held by the pins, it will not bulge to any perceptible extent. In Straub's experiments the exposed choroid bulged even under a sub-normal pressure, except when firmly fixed by its internal attachments; in the latter case it did not bulge under the normal pressure to any considerable extent; but this, as

we have just seen, proves nothing as to the amount of pressure which the choroid takes off the sclera when the latter is entire.

Again we differ from the author as to the ability of the sclera to bear high pressure for long periods of time without distension. In cases of long-standing glaucoma, in which, as he tells us, the tonicity of the uveal coat is lost, the sclera should of course progressively enlarge under the high pressure; in the eyes of children it usually does so, but the adult sclera will bear very high pressure for months without progressive distension.

Further difficulties present themselves when we attempt to reconcile Straub's hypothesis with daily clinical experience. If, as Straub maintains, the tonicity of the ciliary muscle is essential to the free circulation of blood through the large veins of the choroid, and to the easy passage of lymph through the cornea, how is it that complete paralysis of the ciliary muscle by atropine, or by lesion of the third nerve, produces no increase of the intra-ocular pressure, no enlargement of the anterior ciliary veins or other evidence of embarrassed circulation, and no corneal disturbance?

We can corroborate Straub's statement that in bisected glaucomatous eyes the choroid does not usually retract from the sclera as it does in normal eyes, in other words that a loss of tonicity in the ciliary muscle is a part of the glaucoma process; but we should regard this change rather as a consequence than as the prime cause of the high pressure. In some glaucoma specimens we have found a well marked retraction of the choroid; on the other hand, the non-retraction is as frequent in secondary as in primary glaucoma, and it is certainly not the starting-point of the secondary form.

On the whole, we think that the author of this interesting paper has much over-estimated the ability of the choroid to relieve the sclera from internal pressure. He does not, in our opinion, prove that the muscular fibres of the ciliary muscle and choroid have any other function than the control of the accommodation, or that their paralysis causes any other than accommodative disturbances. P. S.

GEORGE A. BERRY (Edinburgh). *Diseases of the Eye. A practical Treatise for Students of Ophthalmology.* *Young J. Pentland, Edinburgh and London, 1889.*

This treatise by a well-known worker in the field of ophthalmology is a handsome volume of 650 pp., and we may open our criticism of it by giving expression to the opinion that advanced students of this branch of medical science will do well to add it to their library. We cannot so warmly recommend it to the average medical student or the busy general practitioner.

A very noticeable feature in the book, and one which places it in striking contrast to the usual Handbooks, is the large number of coloured plates. All those illustrating the external diseases of the eye are reproductions of coloured drawings from life by Dr. Tatham Thompson; and the illustrations of ophthalmoscopic appearances and of a few pathological specimens are by the same artist. It is unfortunate, though perhaps unavoidable, that the coloured plates should not all have exhibited an equal degree of excellence. On the whole they are very commendable, but we venture to hope that in another edition several will be replaced by new and better illustrations.

The book is divided into three sections, of which the first includes the diseases of the eyelids, eye, optic nerve, and orbit, with a chapter on "amblyopia, amaurosis, and other anomalies of vision"; the second, refraction and accommodation, affections of the ocular muscles, the theory and use of the ophthalmoscope, and examination of the eye; the third section deals entirely with operations. Although there are drawbacks to the plan of relegating all the operative treatment to one part of a book, we are inclined to agree with the author as to the general advisability of so doing.

We have felt not a little disappointed at the number of badly expressed sentences we have come across in reading through the book, sentences which most men would have to read twice to feel certain that they had grasped the author's meaning, and which would assuredly puzzle beginners. With our experience of the author's capabilities of

clearly expressing himself in previous writings, we are tempted to think that some parts of this, his *magnum opus*, have been too hurriedly completed. In this connection also we may deprecate the introduction of unusual and hybrid words which have equally expressive and more euphonious equivalents. It jars on our senses to read of an "ectropionised" lid, a "hypermature" cataract, etc.

While in the greater part of the volume there is ample evidence of the possession by the author of a wide knowledge of ophthalmic literature, and an extensive experience in ophthalmic practice, there are not a few paragraphs which make the reader inclined to inquire if the writer has had opportunities of seeing the practice of surgeons outside his own *clinique*. In a book which is clearly not intended solely, if indeed chiefly for the third year student, it is surely an error of judgment to lay down hard and fast rules for treatment, even upon points about which there is much unanimity of opinion.

In the first section we should select chapter V., on diseases of the iris and ciliary body, and chapter XI., on amblyopia, etc., as the best; the former, as far as the iris is concerned, is full and detailed; the latter, on subjects to which the author has devoted particular attention, is extremely interesting, and well repays perusal.

In Chapter III., devoted to diseases of the cornea, we meet with some statements which differ noticeably from those to be found in most text-books. For instance, the author appears to have considerable doubt as to the connection between interstitial keratitis and hereditary syphilis; nevertheless, the description given of the symptoms and signs of this disease of the cornea would, we think, leave very little doubt in most minds as to the syphilitic nature of the ailment. In consequence, probably, of the writer's uncertainty on this point, we find the assertion that "it is very doubtful . . . in how far any treatment is of any avail."

Chapter IX., on sympathetic ophthalmitis, contains a succinct account of the various theories as to the pathology of this most important affection. The author favours (we think rightly) the germ theory of the disease, as supported by the experiments of Deutschmann, Gifford, and others.

He falls foul of some of the results arrived at by the Ophthalmological Society's Committee, which are, nevertheless, by far the most important piece of statistical evidence, on the subject which has been hitherto obtained.

The second section embraces subjects evidently congenial to the author, and, although the pages of fractions and formulæ will tend to alarm many students, the chapters are well and carefully written, and not quite so difficult as they appear at first sight.

That on affections of the ocular muscles is of great interest, and one from which readers will derive much valuable information.

The third section, on operations, though perhaps rather curtailed for a volume of this size, gives a brief but good account of nearly all the operations generally practised by ophthalmic surgeons, and there are but few points over which we need linger. But we must express our entire disagreement with the author's opinions as expressed on page 623. Speaking of the operation of iridectomy in glaucoma, he says: "Some operators make the incision in cases of glaucoma with a narrow cataract knife instead of with a keratome. This practice cannot be too strongly condemned." He proceeds to give his reasons for this very decided statement, the force of which we confess we are unable to see. Our knowledge of British operators may be less wide than the author's, but we venture to think he would have more nearly represented the procedure of his fellow-countrymen if he had written, "Some operators make the incision . . . with a keratome."

The use of a 20 per cent. solution of cocaine to the eye as recommended for tenotomy seems to us unnecessary. We have not failed to obtain sufficient local anæsthesia in non-inflamed eyes with a 2 per cent. solution.

A very full and generally accurate index completes this volume. We have drawn attention chiefly to what we think are the least satisfactory points in the work, but, none the less we congratulate the author upon having produced a book of which he may well be proud, and which will, we doubt not, become one of the leading text-books of ophthalmology in this country.

ADOLF VOSSIUS (Königsberg). *Grundriss der Augenheilkunde (Outlines of Ophthalmology).* *F. Deuticke, Leipzig and Vienna, 1888.*

This book, from the pen of the Professor of Ophthalmology at Königsberg, is one of 450 pp. with 95 illustrations. Although it adds another to the already enormous list of similar text-books in the German language, its production is justified by the evident thoroughness and care with which it is written.

The author possesses in high degree the power of clearly and briefly expressing his meaning, a faculty the results of which are gladly welcomed by readers, especially those whose native tongue is not that of the writer. Professor Vossius's work is primarily one for students, and he has, we think, put before them in very readable form most that is of importance in relation to ophthalmology. The illustrations are, with few exceptions, rough and diagrammatic. The introductory chapter deals with generalities concerning the examination of the eyes, dressings, antiseptics, anæsthetics, etc. This is followed by a clearly-written chapter on refraction and accommodation and their anomalies, and another on disorders of the ocular muscles. In the description of strabismus we miss any mention of angular measurement of the deviation, probably the most accurate method in use. The space devoted to the operations for the relief of ptosis is meagre, and several good operations are not mentioned. The treatment of trichiasis by electrolysis is not given, although most of the numerous operative procedures are described. The chapter on diseases of the orbit is brief ; it includes a good account of pulsating exophthalmus.

Diphtheritic conjunctivitis, as it occurs in North Germany, is treated at some length, and attention is drawn to the differential diagnosis between this affection and purulent conjunctivitis. Granular conjunctivitis is held to be of parasitic origin, further researches being necessary to determine the true micrococcus and its distinctive characters.

In the chapter on corneal affections under the heading "parenchymatous or interstitial keratitis," a very brief reference is made to keratitis punctata as a variety of diffuse corneal inflammation, a classification certainly not in accord with recent pathological investigations.

The use of the galvano-cautery in suppurative and serpiginous ulcers of cornea is recommended. In the treatment of kerato-conus, however, no mention is made of it, the removal of an elliptical piece of the cornea (Græfe) and trephining (Bowman, Wecker) being the methods described.

Diseases of the iris are treated in considerable detail. The author doubts if tubercular iritis ever occurs as a primary disease. A very intelligent account is given of the theories as to the nature of sympathetic ophthalmitis; the writer seems to believe in the spread of infection from one eye to the other along the optic nerve, and mentions cases observed by himself in which a neuro-retinitis was the earliest symptom in the sympathising eye.

Exenteration is strongly recommended as a substitute for excision, in all cases except those of intra-ocular tumour. From this advice we dissent. Iridectomy is advised as one step in extraction of senile cataract; indeed, the question of extraction without iridectomy is not discussed. Lamellar cataract is placed (and probably rightly so) in the congenital group. The author distinguishes between the soft and membranous forms of total congenital cataract; the former, he states, is always bilateral, the latter generally so; the membranous may be a late stage of the soft variety, or occur primarily.

The operative treatment of detachment of retina is thought unsatisfactory; on the whole, the author prefers rest in bed, and bandaging the eyes. Diabetic retinitis is mentioned, but receives very scant description. Glioma retinae may, the writer holds, originate in different layers of this tunic; he dissents from the opinion of many observers that it always begins in the inner nuclear layer. If no recurrence or metastasis has occurred four years after the removal of the eye, the case may be regarded as completely cured. The chapter on optic nerve disease

is very good ; in this, however, as in several other chapters, in which, as yet undecided questions as to pathogenesis are discussed, the author has perhaps erred on the side of giving too fully numerous theories ; students would, we fear, obtain very mixed ideas of the pathology of optic neuritis.

Chapter XV., dealing with amblyopia and amaurosis, is lengthy and thorough, especially that portion describing the methods of investigating such cases. Anomalies of the field of vision are treated at considerable length. The two last chapters describe glaucoma, ophthalmo-malacia and injuries of the eyeball, the latter including those resulting from lightning stroke.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

FRIDAY, JULY 5TH, 1889.

J. W. HULKE, F.R.S., President, in the Chair.

Monocular, (?) Suppurative Iritis.—Dr. Rockliffe (Hull) read notes of this case occurring in a girl aged 8. For a week before admission she had suffered from "acute iritis," without lacrymation or photophobia. The family and personal history were exceptionally good. When examined the right eye had no perception of light. There was acute iritis, the iris being studded with nodules, varying in size, their apices yellowish, their bases surrounded by bright red vessels. No hypopyon ; cornea clear ; eyeball not tender ; T + 1. In a week all pain had disappeared, and did not recur during the subsequent history of the case. Three weeks after admission the nodules had increased considerably in size, and two ciliary staphylomata had appeared. A month later, the iris was becoming atrophic with T - 1 ; and two months later the staphylomata had entirely disappeared, and the iris was much disorganised ; T - 2. The eyeball was excised six months after the first visit, when it

was somewhat shrunken. On section there was found to be total posterior synechia, with thickening of iris and ciliary body, degeneration of lens and detachment of retina. Dr. Brailey examined the specimen microscopically, and reported : "There are rounded collections of cells, clearly new growth, probably inflammatory, on the inner aspect of the iris and ciliary body, and in and behind the base of the iris ; to a less degree in the remainder of the iris. The central cells of these collections exhibit signs of inflammation, but an absence of the characteristics of tubercle. One small collection is present in the choroid." He considered that the case was one of irido-cyclo-choroiditis of a peculiar nature, with many of the features met with in sympathetic inflammation. Dr. Rockliffe referred to cases reported by Hutchinson, Eales, Nettleship, Lang, and Benson, and thought the evidence was more in favour of inflammatory new growth than tubercle or syphilitic gummata.

Mr. Hulke understood that the speaker regarded the lesion as an inflammatory neoplasm. He inquired if bacilli had been searched for.

Dr. Rockliffe replied that no search had been made for micro-organisms.

Dr. W. J. Collins said that a case he had put on record closely resembled the one under discussion ; it occurred in one eye only, the exudation was plastic in character, nodules of pinkish grey lymph being present. Vision was not greatly damaged, and the inflammation did not go on to suppuration. He had ventured to name it "granulation iritis." Mr. Hutchinson, in the 8th volume of the *Moorfields Hospital Reports*, had recorded five cases occurring in children above the age of infancy ; in not one was syphilis excluded, and in more than one it was distinctly proved to exist. He believed that some of these cases were due to overlooked traumatism.

Dr. Mules thought it was by no means too late to seek for bacilli if any material were still available.

Dr. Rockliffe said there was no history of injury, and he had no material at hand for a bacteriological examination.

Cavernous Angioma of the Orbit.—Dr. Emrys Jones (Manchester) communicated this case. The patient was a

girl, aged 18, who first came under observation in June, 1884, with protusion of the left eyeball, which had been slowly increasing for nine years. The proptosis then measured an inch and a half. An elastic tumour could be felt enveloping the eyeball. There was no pulsation, no fluctuation, no pain. Downward movement of the eye was lost; other movements diminished; the pupil reacted to light; optic nerve pale; $V = 14 J$. On July 17th ether was administered, the globe enucleated, and a cone-shaped tumour contained in a capsule scooped out. The optic nerve was found imbedded along the inner aspect of the growth, which measured 8 centimètres \times 7 centimètres \times 5 centimètres. Microscopically the growth consisted of an open sponge-like framework of fibrous tissue, with numerous round, sinuous and irregular cavities filled with blood. Sections of the growth were shown.

The President spoke of a specimen of cavernous angioma in the Moorfields Hospital Museum, which was removed from the orbit of a young boy by the late Mr. Critchett. In that case there was no palpable pulsation, but the proptosed eyeball could easily be pressed backwards into its normal position, showing that there was no solid mass behind it.

Sarcoma of Ciliary Body.—Mr. Simeon Snell (Sheffield) related notes of two cases :—1. The first occurred in a woman, aged 62, whose right eye was affected. She was first seen on December 2nd, 1879. Patient complained of an injury to the eye by a spark from the fire sixteen months before; it was, however, well in a few days; four months ago she first observed a dark brownish speck in the upper and inner ciliary region; it was then about the size of a pin's head. When seen vision was good, and there was no pain. The elevation in the ciliary region was the size of a small pea, and extended close up to the cornea; it was also visible internally, and extended for some distance close to the ciliary margin of the iris. The patient disappeared for a time, but returned with the growth enlarged. Enucleation performed August 30th, 1880. The tumour was a melanotic sarcoma. 2. A man, aged 74.—First seen in April, 1883, when he complained of increasing dimness of sight of his right eye.

There was then some opacity of the lens. In February, 1884, when he again presented himself, there was a blackish discolouration, and some bulging of the sclerotic (ciliary region) above. Vision was lost. The eyeball was excised on March 24th, 1884. The tumour was much larger than the external appearances suggested, about the size of a bean; and had the characters of a pigmented round-celled sarcoma. The patient was reported alive and well, and showing no evidence of recurrent growth more than five years after the operation.

The Application of Electricity in Ocular Paralysis.—Dr. Buzzard demonstrated a method by which electric currents could be applied directly in cases of oculomotor paralysis. The mode of application had been originally described by him in *The Lancet*, 1875, and he had since employed it with success in many instances. A moistened plate rheophore is applied to the nape of the patient's neck, and connected with one pole of a Leclanché battery. The operator grasping the other rheophore, well wetted, in his left hand, and securing good contact with the skin of his palm, applies the index finger of his right hand to the patient's globe in the situation of the various external muscles of the eye. The finger is covered with a single thickness of well-moistened muslin, the conjunctiva should be previously rendered insensitive by cocaine. The strength of current advised is from 1.5 to 2 milliamperes, and the alternate application and lifting of the finger, by closing and opening the circuit, gives rise to a feeling of a slight electric shock in the terminal joint of the finger. The operator should first test the strength of the current upon the patient's cheek. The point of the finger thus employed acts as a sentient rheophore, and can be applied with nicety and delicacy to various parts of the eye, the operator being constantly aware by the feeling in his finger of the strength of current employed.—Better results, it is thought, are to be obtained in this manner than by the plan commonly adopted of applying the metal rheophore to the closed lids.

A patient was shown who had recently recovered under this treatment from complete paralysis of the right third nerve. Improvement commenced on the first application

of the current, after the patient had been taking from 60 to 90 grains of iodide of potassium daily for thirty-five days with no signs of any return of power. Reference was also made to another recent case of paralysis of one third nerve. The patient, a lady, had been salivated, besides taking large doses of iodide for several weeks without result. After resting *in statu quo* for a month without specific treatment, improvement followed the first application of electricity, and complete recovery rapidly took place as far as the levator palpebrae and the internal rectus were concerned, the other muscles, although improved, still remaining weak.

Card Specimens.—The following patients and card specimens were shown :—

Mr. L. Werner : Microscopical Preparations, illustrating Subconjunctival Cysticercus.

Mr. Hartridge : Ophthalmoscopic Drawing of Peculiar Appearance at the Macula.

Mr. Critchett : Scissors for Division of Anterior Synechia.

Dr. S. H. Habershon : Case of Unilateral Central Scotoma.

Mr. Lloyd Owen : Specimen showing Exhibitor's Method of Mounting Eyeballs.

Mr. Brailey : Peculiar Thickening of the Anterior Part of the Conjunctiva and of the Subconjunctival Tissue in a Child, probably Tubercular.

Annual General Meeting—The business of the annual meeting was then taken, the Secretary reading the report of the Council.

On the motion of Dr. Barlow, seconded by Mr. Waren Tay, the report was adopted.

The Treasurer's balance sheet was presented, and showed by its figures an improvement in the finances of the Society.

Mr. Critchett moved, and Mr. Simeon Snell seconded a vote of thanks to the retiring President, which was carried unanimously.

Mr. Hulke replied in a few well-chosen words, expressing the pleasure he had always felt in presiding over the meetings of the Society during the past three years.

RECENT LITERATURE.

A. RETINA. OPTIC NERVE. CENTRES.

BERNHEIMER. Ueber die Entwicklung und den Verlauf der Markfasern im Chiasma Nervorum Opticorum des Menschen.

Heidelberg, 1889.

GAST. Ein Fall von Ophthalmoplegia exterior congenita.

Kl. Mon. Bl., June, 1889, p. 214.

HAMBURGER. Doorsnijding van den nervus opticus bij kikkvorschen, in verband med de beweging van pigment en kegels in het netvlies onder den uivloed van licht en dinstier.

Onderzoek, physiol. Labor. Utrecht. XI., p. 58.

HOLLINGER. Studien über die elementaren Farbenempfindungen.

Skandinav. Arch. f. Physiol. I., p. 152.

KNECHT. Das Verhalten der Pupillen bei Geisteskranken.

Irrenfreund XXX., Nos. 9 and 10.

RAEHLMANN. Ueber ein pulsirendes Dehnungs-aneurysma der Arteria centralis retinæ.

Kl. Mon. Bl., June, 1889, p. 203.

RANDALL. Ueber den nasalen Reflexbogenstreif von Dr. L. Weiss.

Kl. Mon. Bl., May, 1889, p. 178.

SCHOELER. Zur Operativen Behandlung und Heilung der Netzhautablösung.

Berlin, 1889. *H. Peters.*

THOMA. Ueber die Elasticität der Netzhautarterien.

V. Graefe's Arch. XXXV. 2, p. 1.

B. UVEAL TRACT. VITREOUS AND AQUEOUS. LENS.

DE WECKER. L'avenir de l'extraction.

Ann. d'Oculist., May—June, 1889.

DUERR AND SCHLEGTENDAL. Fünf Fälle von Hydrophthalmus congenitus.

V. Graefe's Arch. XXXV. 2, p. 88.

HIRSCHBERG. Tuberculöse Geschwulst der Iris.

Münch. Med. Woch. 22, p. 283.

KOLINSKI. Zur Lehre von der Wirkung des Naphthalins auf das Auge und über den sogenannten Naphthalinstaar.

V. Graefe's Arch. XXXV. 2, p. 29.

STEFFAN. Weitere Erfahrungen und Studien über die Kataraktextraktionen 1882-1888, Antisepsis und Technik.

V. Graefe's Arch. XXXV. 2, p. 171.

WICHERKIEWICZ. Ueber das geeignetste Verfahren der Kapseleröffnung behufs Staarentfernung.

Kl. Mon. Bl., May, 1889, p. 163.

C. CORNEA. CONJUNCTIVA. SCLERA.

LEBER. Noch einmal die Fibringerinnungen in der Hornhaut.

V. Graefe's Arch. XXXV. 2, p. 250.

PANAS. La kératite phlycténulaire.

Gaz. Med. de Paris VI., No. 8.

VOSSIUS. Ueber die eigenthümliche grünliche Verfärbung der Cornea nach Traumen, und ihre Beziehung zu Cornealblutungen.

V. Graefe's Arch. XXXV. 2, p. 207.

J. B. WOLFE. Staphylôme total de la cornée, corrigée par une operation.

Ann. d'Oculist., May—June, 1889.

D. ACCOMMODATION. REFRACTION. MOTOR APPARATUS.

MAUTHNER. Die Lehre von den Augenmuskellähmungen.

Wiesbaden, 1889, Bergmann.

WICHERKIEWICZ. Was haben wir von der Anwendung mydriatischer und myotischer Mittel bei fixen Trübungen brechender Medien zur Verbesserung der Sehfähigkeit zu erwarten.

Internat. Klin. Rundschau., 1889.

E. EYELIDS. LACRIMAL APPARATUS. ORBIT.

- FORSTER. Blepharoptosis congenita.
Munch. Med. Woch. 22, p. 386.
- GESSNER. Enophthalmus dexter übergehend in Exophthalmus bei Vorwärtsbeugen des Kopfes.
Centr. f. prakt. Augenheilk., June, 1889.
- VAN DUYSSE. Sarcome de la paupière.
Ann. d'Oculist., May—June, 1889.
- WALDHAUER. Fremdkörper in der Orbita.
Deutsche. Zeitschr. f. Chirurg. XXIX.

F. MISCELLANEOUS.

- ALEXANDER. Syphilis and Auge.
Wiesbaden, 1889, T. F. Bergmann.
- DENNISENKO. Zur Frage vom Baue der Augen der Knorpel Gonoiden.
Kl. Mon. Bl., July, 1889.
- ENGELMANN. De Microspectrometer.
Onderzoek. physiol. Labor. Utrecht., XI., p. 39.
- ENGELMANN. Die Purpurbakterien und ihre Beziehungen zum Licht.
Onderzoek. physiol. Labor. Utrecht. XI., p. 68.
- HUTCHINSON, J., JR. Aids to Ophthalmic Medicine and Surgery.
Baillière Tindall and Cox, London, 1889.
- KÖENIGSTEIN. Angeborene Augen-Anomalien.
Wien. Klin. Woch. II., No. 18.
- LOTZ. Internationale Sehprobentafel mit einfachen Zeichnungen zur Bestimmung der Sehschärfe bei Nichtlesern und Kindern.
Basle, 1889.
- NIEDEN. Schrifttafeln zur Bestimmung der Sehschärfe für die Ferne.
Wiesbaden, 1889.
- SCHWEIGGER. Ueber den electrischen Augenspiegel.
Arch. für Physiol., 1889.

SNELL. Presidential address on some Points of Progress in Ophthalmic Surgery. Delivered at the Annual Meeting of the Yorkshire Branch of the British Medical Association.

Brit. Med. Journal, July 13, 1889.

STRAUB. Ueber das Gleichgewicht der Gewebs und Flüssigkeits spannungen im Auge.

V. Graefe's Arch. XXXV. 2, p. 52.

CONGENITAL MALFORMATIONS OF THE EYEBALL AND ITS APPENDAGES.

BY R. MARCUS GUNN, F.R.C.S.,

SURGEON TO THE ROYAL LONDON OPHTHALMIC HOSPITAL,
MOORFIELDS.

LECTURE II. (*continued*).

Besides the malformations of the retina and choroid just described, there are numerous other less important peculiarities, some of which I may now briefly mention.

Not infrequently we find small, round, black spots on the fundus, usually few in number, and not interfering with normal vision. They have an appearance such as would be presented by tiny drops of black pigment flicked over the red fundus from a brush, and are due to localised aggregations of retinal epithelial pigment.

In some cases, again, we may observe very small bright dots in the retina, chiefly in the neighbourhood of the optic disc. This peculiarity was described some years ago,* and, for want of a better name, I am in the habit of calling them "Crick dots," from the name of the patient in whom they were first observed. They can only be seen by the direct method, and are most easily distinguished when we employ a comparatively weak illumination without dilatation of the pupil. As I have already said, they are very small, and they are generally found near the large vessels in the optic disc neighbourhood, flashing into view and disappearing on

* Trans. Ophth. Soc., vol. iii., p. 110.

small movements of the mirror, but always re-appearing in the same position, and best seen near the edge of the image of the flame. They often occur only in a comparatively small area of the fundus, and the individual dots are remarkably equidistant from one another. When their position corresponds with that of a retinal vessel, they are found to be anterior to it, and then their size can be estimated as approximately one-fifth the breadth of a large artery. They are especially to be looked for in patients who complain of asthenopia, with little or no error of refraction, and with no muscular insufficiency: a congestive, weak-looking condition of the eyelids is often associated with the presence of the dots. On questioning, we find that the asthenopia is worst on exposure to glare, as from living near the sea, or from having to work at large white surfaces (sewing, drawing, etc.). The condition is sometimes hereditary, and I have frequently found it in several members of a family. In the absence of microscopical examination of the retina in these cases, the cause of the appearance remains unexplained.

Opaque nerve fibres usually occur in the form of a wedge or triangle, having its blunt apex at the edge of the optic disc, and its base directed towards the equator. The affected area is brilliantly white, often rather fluffy in appearance, and the large retinal vessels here are almost, if not quite, concealed. It seldom reaches far peripherally, and usually ends in an irregular teased-out looking border. It is commonly situated above or below the disc, but may completely surround it. Exceptionally the patch of opaque nerve fibres is situated at some distance from the optic disc, and separated from the latter by normal red fundus; it is then more brush-like in form, the inner end presenting an abrupt edge, while its equatorial end is broader and teased-out looking. The whiteness and opacity in all cases of this nature are due to the presence of the

medullary sheath round the axis cylinders. Normally, all the nerve fibres lose this covering at the scleral aperture, but exceptionally it is retained for some distance further, or, in other cases, it is first lost and afterwards re-assumed.

Irregularities in the blood-vessels of this region not infrequently present themselves. It is by no means uncommon to have the retina supplied in part by a branch from one of the posterior ciliary arteries, a so-called *cilio-retinal artery*.^{*} It generally pierces the disc near its edge, and then ramifies over the adjacent retina after the manner of a branch of the *arteria centralis*. In cases of embolism of the latter, the presence of a cilio-retinal vessel becomes important, as the segment of retina corresponding to this blood-supply retains its visual function.

Occasionally we find the retinal vessels very tortuous, simply as a congenital peculiarity, and without there being any intra-ocular disease. Very rarely a direct communication between a retinal artery and vein has been observed,[†] and sometimes between a retinal and choroidal vessel. Again, in cases of nævus affecting the ocular conjunctiva, we may get a nævoid condition in the choroid also.

The *optic disc* varies much in appearance in different individuals, and not infrequently such congenital peculiarities are worthy of remark. For example, its entire area, or one segment of it, may be white and opaque, from the retention of the medullary sheath by the nerve fibres. Or, a fine whitish veil may partially conceal the vessels near their exit, an appearance due to a prolongation of the connective tissue which normally surrounds the central vessels in the nerve behind the globe. On one occasion I found a very deep, narrow pit in the disc, much deeper than and distinct from the physiological excavation. The surface of the disc is often partially

^{*} Nettleship, R.L.O.H. Rep., vol. viii., p. 512; vol. ix., p. 161.

[†] Trans. Ophth. Soc., vol. iv., p. 156.

obscured by deposits of black pigment. All these conditions may be mistaken for pathological changes, but are quite compatible with normal vision.

Malformations of the Lenticular Apparatus.—A normally-shaped, transparent lens is sometimes found out of its proper axial position. This displacement is usually more or less upwards. It is a distinctly hereditary peculiarity, and has occasionally been met with in representatives of several generations of the same family.* The condition may be accounted for by a retarded development of the suspensory ligament, permitting gravitation to influence the lens while lying more or less free within the globe. From the position of the head of the foetus, the tendency would consequently be to displacement upwards, such as we usually find.

Congenital Cataract.—There are many forms of congenital opacity of the lens, the whole of this structure being often involved, and nearly always symmetrically in both eyes. The lens may be uniformly opaque and milky-looking, or there may be chalky white patches or striæ. A thorough examination is frequently rendered impossible by the small size of the pupil, and its very imperfect dilatation under atropine.

In one comparatively common form the opacity only involves part of the lens. On dilating the pupil (as can readily be done in this variety) a disc-like opacity is observed, with a clear peripheral part outside it. On accurate examination we can usually easily satisfy ourselves that the opaque part is in the form of a zone, surrounding a clear centre, and the term *zonular* or *lamellar cataract* is consequently applied to it. A certain amount of doubt has been cast upon the congenital nature of this variety of cataract, but it is certainly developmental in nature at any rate, and most probably is always already present at birth. It would appear that the fibres affected are those peripheral ones

* Martens, R. L. O. H. Reports, vol. ix., p. 435.

developed after the formation of the nucleus, as I described in my first lecture.

The form of cataract known as *pyramidal* is also, I believe, sometimes hereditary. It appears as a chalky white opacity on the anterior pole of the lens, and when viewed from one side its apex is often seen to project forward into the aqueous. It may result from an interference with a proper development of the anterior part of the capsule, possibly as a result of intra-uterine inflammation, or merely from the mesoblastic structure then present in the pupil coming into contact with the adjacent cornea.

One or more of the *external ocular muscles* may have occasionally an abnormal insertion into the sclerotic, so that the movements of the globe are interfered with. Congenital strabismus may be due to this cause, or, as is sometimes the case, to absence of some of the muscles or of the nerves supplying them. These peculiarities of development are often markedly hereditary.*

It will be needless for me here to say much about *congenital tumours* of the eyeball and its appendages. *Moles* and *nævi* of the eyelids and *dermoid tumours* of the eyebrow are by no means rare. Sometimes the conjunctiva alone is the seat of *nævus*, and I have recently had a case where the semi-lunar fold was the only part affected. Dark pigmented patches or moles occur on the ocular conjunctiva over the sclerotic. Dermoid tumours are also met with in this situation, as well as over part of the cornea. Occasionally we find a firm, lobulated tumour projecting beneath the outer end of the upper lid; it is fibro-fatty in nature, and is presumably an additional lobe of the lacrymal gland which has undergone degeneration, or in which true gland-tissue has never been developed.

I have now concluded what has been little more than a sketch of the Congenital Malformations of the Eyeball and its Appendages. I think I am justified

* Lawford, Trans. Ophth. Soc., vol. viii., p. 262.

in saying that in no other area of equal size in the body do we meet with so varied a series of malformations, and that in no department of surgery is embryological knowledge more constantly useful than it is in ophthalmology. I would impress upon all of you, therefore, however general your practice is to be, the desirability of making yourselves familiar with the main congenital peculiarities to which the eye is liable, and I trust these lectures may have proved useful to you with this object in view.

J. A. LIPPINCOTT (Pittsburg). Binocular Metamorphopsia produced by Correcting Glasses. *Knapp's Archives of Ophthalmology*, Vol. XVIII., No. I., p. 18.

The phenomena which form the subject-matter of this paper are the same as those described by Cuthbertson under the term binocular astigmatism, and attributed to "harmonious non-symmetrical action" of the oblique muscles by Savage (*vide O. R.*, March, 1889, p. 83).

Lippincott rejects the hypothesis of a change in the position of the meridians of the astigmatic eye (either due to rotation of the globe, or irregular ciliary contraction) for the following reasons: (1.) In those paralytic cases where an abnormal rotation of the globe is present, the relations of the objects are changed spontaneously, and no correction of an existing refractive error is required to bring out the defect. (2.) The cases in which the astigmatic meridians occupy different positions in near and distant vision are exceedingly rare, and binocular vision plays no necessary rôle in such cases. (3.) A fairly normal appearance of the radiating test lines after rotating the cylinders to obviate the supposed rotation of the globes cannot be accepted as proof of a real correction of the astigmatic defect, because the eyes supplement each other. (4.) The phenomena treated of are by no means rare; on the contrary, they are seen in nearly all cases of anisometropia with binocular vision. The presence of astigmatism is not a *sine quâ non*,

although the phenomena are most prominent in those cases of astigmatism in which the principal meridians are oblique.

Binocular vision is essential. When the eyes take cylinders of the same strength their axes must not be parallel. The manifestations of this metamorphopsia are of two kinds: (1.) Want of parallelism of the sides of rectangles, *i.e.*, an alteration in the relative length of the top and bottom of the object. (2.) Want of parallelism of the top and bottom, *i.e.*, an alteration in the relative length of the sides. All these changes can be produced in astigmatic or in emmetropic eyes by appropriate adjustment of convex or concave cylinders, and the explanation given by Lippincott is the following: A convex cylinder may be regarded as made up of two prisms with their bases meeting along the axis of the glass; a concave cylinder, on the other hand, as made up of two prisms with their bases at the edges of the glass away from the axis. The effect produced by a convex cylinder with its axis lying obliquely from right to left is to deflect rays of light proceeding from the upper portion of a vertical line towards the right, and rays proceeding from the lower portion towards the left. A concave cylinder in the same position will deflect the rays from the upper portion of the line towards the left, and those from the lower portion towards the right—the deflection will be greater as the cylinder is stronger, and as its axis approximates most closely to the position midway between vertical and horizontal.

Now an eye with simple H.As. may be regarded as an emmetropic eye with a concave cylinder, and an eye with simple M.As. as an emmetropic eye with a convex cylinder in front of it. Hence, in simple As. with axis oblique the image of a vertical line occupies an oblique position on the retina, and there ought to be an apparent inclination of one or both sides of square surfaces, producing as a result the illusion that the top is wider (or narrower) than the bottom—this is the manifestation seen in Group 1.

Group 2 has two sub-classes: (a) Anisometropia without astigmatism; (b) unilateral or bilateral astigmatism. In the first it is found that if spherical glasses of different degrees be placed before the two eyes, the side of the object

corresponding to the higher refractive index appears wider. Explanation is hardly necessary ; for Donders has shown that a convex glass placed before an eye by moving the nodal point forward enlarges retinal images, a concave glass by moving the nodal point backwards diminishes them.

In the second (*b*), it is found that if a convex cyl. (axis vertical) be placed before one eye alone, the side of objects corresponding to the cylinder appears wider ; if a concave cyl. (axis vertical) is similarly used, the result is to diminish the width of the corresponding side.

Experimenting with emmetropic eyes, Lippincott found that (*a*) a + cyl., ax. vert., or a - cyl., ax. horiz., before either eye, widens the corresponding side of a square ; (*b*) a - cyl., ax. vert., or a + cyl., ax. horiz., narrows the corresponding side ; (*c*) either cylinder placed vertically has a greater effect than when placed horizontally. The magnifying effect of a + cyl. progressively diminishes as its axis is turned from the vertical till it becomes *nil* at an angle of 45° . A diminishing effect is then produced which increases till the axis reaches the horizontal meridian. Precisely the converse takes place with a - cyl. ; (*d*) the narrowing or widening increases with the strength of the cylinder till the latter is so strong and the image is so blurred that monocular vision is the result ; (*e*) while the effect of a given cylinder is not uniform in different persons or absolutely constant in the same person, it is approximately true that a + cyl., ax. vert., magnifies about twice as much as a - cyl., ax. horizont. ; and a - cyl., ax. vert., diminishes about twice as much as a + cyl., ax. horizont.

The explanation of these phenomena is not very easy, *e.g.*, a + cyl., ax. vert., before the left eye, the right being shut, while it increases the width rather seems to diminish the height of a square. If the right be opened, the left side at once appears markedly higher. So a - cyl., ax. vert., before the left eye, the right being shut, appears to increase the height of a square ; but if the right eye be opened, the left side at once appears lower. So also, *a priori*, a + cyl., ax. horizont., ought to increase, and a - cyl., axis horizont., ought to decrease the height of the corresponding side.

There are reasons for supposing the explanation to be connected with accommodation. Donders has shown that if accommodation be relaxed objects appear larger, their distance being over estimated. Besides, experiments do not give uniform results in the same person, and the effect is most manifested at the reading distance—the point where accommodation is most exercised. At the same time the phenomena are observed in atropinised eyes. It is possible, however, that the explanation is to be found in a change produced by cylindrical lenses in the dynamical or mental element of accommodation—in the accommodative impulse.

If this view be correct, we must assume that the accommodative impulse is unequally affected on the two sides, and that the degree varies with the position of the axis of the glass, *e.g.*, a + cyl., ax. vert., must relax, while a — cyl., axis vert., must stimulate the accommodative impulse of the eye before which it is placed. Conversely, a + cyl., ax. horiz., stimulates, and a — cyl., axis horiz., relaxes. The full effect of this relaxation or stimulation is greater when the axis of the cylinder is vertical than when it is horizontal.

The phenomena might also be explained, but not so satisfactorily as above, in the following way: The estimation of the height of each side is relegated to the eye on that side, while horizontal measurement is a common ground for the action of the two eyes. Now a + cyl., ax. vert., before the left eye increases horizontal dimensions on that side, and the relations established by the right eye being transferred to the left side make the square appear magnified vertically because it is magnified horizontally.

The phenomena of metamorphopsia are very rarely observed spontaneously, but all oculists have ample opportunity of seeing cases of this kind. It is probable that the patients, who experience them when given correcting glasses experienced them also during their childhood, and gradually acquired the habit of translating inaccurate retinal images into more or less correct mental impressions. This habit persists and leads to an over-correction when the glasses are used. It is probable that the only remedy consists in breaking up this habit, and generally a persistent use of the glasses attains this end, fully enough, at least, to prevent serious annoyance.

J. B. S.

ROSA KERSCHBAUMER (Salzburg).—Senile Changes in the Uvea. *V. Græje's Archiv XXXIV.*, 4, p. 16.

The senile changes which have been found by Dr. Rosa Kerschbaumer in the ciliary body are a diminution in the number of the muscular fibres, and a thinning of the individual muscular bundles, with decrease in the number of nuclei. The spaces between the fibres are either empty or filled with a homogeneous substance, and in some eyes the atrophy of the muscular is accompanied by an hypertrophy of the connective tissue. The ciliary processes are longer and more divided, and this change is more marked in their anterior portion. This has the effect of pushing the iris-root forward towards the cornea, and diminishing the depth of the anterior chamber. The posterior chamber is also reduced in size by the same process. The connective tissue of the ciliary processes is increased, and the connective tissue cells diminished in number—the connective tissue occasionally consisting of homogeneous hyalin-like material.

The walls of the blood-vessels of the ciliary body become thicker, and sometimes seem to undergo a sort of hyaline degeneration. The lumen of the vessels is often narrowed, sometimes obliterated. In such ciliary bodies other vessels are formed with wide lumen and very thin walls, apparently compensating for the narrowed and obliterated vessels.

The basement membrane of the ciliary body increases constantly in thickness from the age of forty onwards. Its outer part loses its structureless aspect and becomes finely granular. The reticulum of the ciliary body increases in depth and thickness, more especially the meridional bundles, and there goes with this hypertrophy an atrophy of intervening meshes. With increasing age the homogeneous aspect disappears, and a longitudinal fibrillation becomes evident. Isolated nuclei and vascularization are seen in many cases.

In old age hyperplasia of the cells of the pars ciliaris retinæ becomes manifest. The cells seem to increase by karyo-kinesis without retrogressive metamorphosis, and ultimately form the excrescences described by Kuhnt at the thirteenth Heidelberg meeting, a central lumen existing all through each excrescence. Flat sessile outgrowths are also

present. The pigment of the ciliary region only occasionally takes part in these outgrowths. The latter are separated from the vitreous by the limiting membrane described by Schwalbe, which becomes thickened in age, more especially where it lies over these excrescences, into which it sends a thickened reticulum. The dilation of the meshes of this reticulum produces the cysts of the ciliary body.

J. B. S.

BAUDRY (Lille). Polycoria, Congenital and Acquired. *Berthier, Paris*, 1889.

FRANKE (Hamburg). Congenital Polycoria. *Kl. Mon. Bl. f. Augenheilk.*, August, 1889.

The author of this essay reported two cases of congenital polycoria to the Ophthalmological Society of Paris in November, 1888. To these he has added extracts of most of the published cases of the congenital form, and some remarks upon the acquired form. The latter we may pass over. Developmental anomalies of the pupil of several varieties are met with, and it is, perhaps, a little surprising that in only one of the cases collected by Baudry the condition was present in both eyes.

Baudry makes five groups of cases :—

(1) In this variety, of which two cases are recorded, (one figured), there is a central pupil, around which are ranged numerous radiating slits in the iris, somewhat club shaped, with the thick end situated peripherally, and the thin end close to the margin of the central pupil.

(2) The second variety, equally rare, is that in which the fissures in the iris are situated about half-way between the pupillary and peripheral edge ; they appear as if resulting from lateral separation of the radiating fibres of the iris. In some instances the additional pupils, in crescentic or triangular shape, are situated at the periphery of the iris, constituting the "congenital irido-diasis" of Von Ammon.

(3) This variety has been designated by Von Ammon "Bridle Coloboma" of iris ; the condition appears to be one of complete or incomplete coloboma of iris with a persistence of the pupillary membrane.

(4) In this class are placed the cases in which the normal pupil is divided into two parts by a band stretching across from one edge of the iris to the other. This band, which is probably a remnant of the pupillary membrane, may be single or multiple.

(5) A group of cases in which several small circular or elliptical shaped apertures are present in the iris, separated from each other by small bridges of apparently healthy tissue.

Of the nineteen cases collected by the writer (he excludes cases of microphthalmos with polycoria), only one is noted as presenting any other congenital defect of the eye-ball, viz., opaque nerve-fibres in the retina. The influence of heredity does not appear to have a large share in the production of this anomaly; two of the reported cases were father and daughter.

Franke's paper is a careful analysis of all the published records of polycoria, with the exception of three cases in Baudry's article. The total number is twenty-four, but he dismisses three of these as untrustworthy. Using the term polycoria in a strict sense, he excludes all cases in which a second aperture is due to a bridge-coloboma or strands of persistent pupillary membrane; and divides the remainder (21 in number) into two groups.

(1) Those in which no central pupil exists; the iris being perforated by a number of holes, varying in size and shape. Only three such cases are recorded.

(2) Those in which a central or slightly eccentric pupil is present, and in addition apertures in the iris, differing considerably in size, shape and position. The number of these supernumerary pupils varies from 1 to 11.

As a result of his examination of these 21 cases, Franke concludes:—That no case has hitherto been recorded of genuine multiple pupils, meaning by this a condition due to an arrest of development or faulty development:

That it is very doubtful if cases are met with, in which multiple apertures in the iris are present *without* a central pupil:

That cases of so-called congenital polycoria are really

either defects in the iris tissue from various causes, or separation of the iris from its attachments. In the former instance the fault probably lies in the vascular structures, in the latter the condition is probably the result of injury during foetal life or at birth, or a consequence of intra-uterine iritis.

J. B. L.

BRITISH MEDICAL ASSOCIATION.

FIFTY-SEVENTH ANNUAL MEETING, HELD AT LEEDS,
AUGUST, 1889.

SECTION OF OPHTHALMOLOGY.

GEORGE ANDERSON CRITCHETT, F.R.C.S. EDIN., President
in the Chair.

Reported by KARL GROSSMANN, M.D.

Wednesday, August 14th.

The President, in his opening address, claimed for ophthalmology that, amidst the recent phenomenal growth of scientific knowledge, it had not "lagged reluctant in the race" and paid a well-deserved tribute to those pioneers of ophthalmic surgery who had encountered and overcome almost insuperable difficulties, although unaided by the ophthalmoscope and by the numerous instruments of precision which we now possess. He then alluded to the great loss which ophthalmology had sustained in the death of Professor Donders, who had devoted his life not alone to abstract scientific research, but also to the practical development of those great discoveries in optics which had conferred such lasting benefit upon mankind. He then passed to the consideration of a subject, the importance of which was becoming more and more recognised by ophthalmic surgeons, viz., the best method of dealing with immature cataracts, and said that the recognised operative methods might be broadly divided into two classes: that which dealt with the immature cataract by immediate extraction, and that which involved an artificial ripening

of the lens before its removal. Amongst the adherents of the first-mentioned plan he spoke of Mr. Couper, Mr. Tweedy, and Dr. McKeown, but pointed out that whilst Mr. Tweedy advocated a very peripheral section of the capsule, Mr. Couper introduced a pair of specially constructed forceps into the anterior chamber and endeavoured to remove a considerable portion of the centre of the anterior capsule. He then alluded to Dr. Forster's introduction of artificial maturation, and spoke of the experiments which had been made by Samelsohn, Helfreich, Otto Schirmer, Ottinger, Hess and Voelcker. The chief dangers of the method seemed to be that, if any excessive pressure were used during the trituration there might subsequently be loss of vitreous when the lens was extracted, and also that the process sometimes produced troublesome iritis. Probably the best solution of the question would ultimately be found in a happy union of Professor Forster's somewhat radical method with the eminently conservative surgery which was advocated by Mr. Tweedy. The subject merited the most careful consideration of all ophthalmic surgeons.

Extraction of Cataract.—Mr. T. Pridgin Teale opened this discussion with a description of the old flap operation. The principal drawback of that "semilunar" flap was the great tendency to large prolapses of the iris. He, therefore, tried for a time one of the modifications with iridectomy, such as that introduced by Graefe and others; but, finding the results, on the whole, less satisfactory than formerly, he resumed the flap operation. From 1863 to 1873 he gradually settled down to his present method, which he calls "the shallow flap," without iridectomy. He has followed this method during the last sixteen years, except when compelled to give it up for special reasons.

With a very narrow Sichel's knife the cornea is entered near its margin in the horizontal meridian, the counter-puncture lying opposite. This done, the blade of the knife is rather abruptly turned forward and carried through the cornea. This gives a shallow flap, with an angular profile, for which a very complete and easy adaptation is claimed.

In reply to several questions, Mr. Teale said he could not

give the exact percentage of cases in which secondary operations were required. Speaking from memory, he would say that he had, as a rule, five to six cases running without the necessity for secondary operations arising. He applied eserin, in the form of a gelatine disc. In earlier years, adhesions of iris used to follow not unfrequently; they had become, however, very rare now; altogether, he did think them of sufficient weight to lead him to abandon the operation. He made a preliminary iridectomy—(1) in the case of a very feeble patient, and (2) when the first eye went wrong.

Extraction of Cataract with and without Iridectomy: an analysis of 300 operations.—Mr. Simeon Snell, who read this paper, illustrated the kind of operation performed, by the introduction of three patients who had each undergone extraction of cataract in both eyes without iridectomy. He stated that the question as to whether or not iridectomy should be associated with extraction of cataract was one of the most prominent in ophthalmic surgery. His views were given in a paper before the Association in 1882 (*British Medical Journal*, 1883, vol. i., p. 44), recording 121 operations by a shallow lower flap; he then thought removal of iris unnecessary, and in that series had excised it in less than half the cases. Others were now advocating the non-removal of iris, and he had himself progressed further in this direction. He did not, however, hold to any hard and fast line. In only about a third of the total 301 operations referred to in the present paper, had iridectomy been performed; indeed, in the latter portion of the series it had only been done in about a quarter, and in this number were included iridectomies for immature cataracts, etc. He related visual results to show that sight was as good, indeed better, without than with iridectomy. The mode of operation performed was briefly as follows. No speculum nor fixation forceps are used. An assistant draws down the lower and the operator holds up the upper eyelid—sometimes he had dispensed with an assistant—spreading open the eyelids and fixing the globe by the fingers of one hand, whilst operating with the other. The section is below and corneal;

a Graefe's knife is used, and it is entered flat in the sclero-corneal junction just below the centre of the pupil; the edge is then turned directly forwards and the section completed; the summit of flap thus lying midway between the edge of the pupil and the periphery of the iris. A case operated on in this way left nothing to be desired as in the cases shown; the pupils were round and the scar in the cornea after a little time was with difficulty detected. Fuller details as to the operation were given in the paper before referred to. Antiseptics were used, and after-treatment with plaster had been employed in about the last 150 cases. Various points were referred to in analysing the cases. Vitreous escaped in 6 per cent. of the 301 cases, six times being associated with dense capsule, etc.; in the last 94 operations it had only been lost once, and in this series the operations without iridectomy were three to one. Prolapse of iris had only occurred three times, or 1 per cent.; good vision in each case. There were others in which the iris became somewhat entangled in the wound, but it was thought not more frequently than tags of iris were seen after other operations. Eserin was only used in a few cases. Other points were discussed and the results were given as follows: In private, the failures were barely 1.7 per cent.; in men (177 out of the total of 301) there were only eight failures, or 4.4 per cent. The greater number of failures in women in hospital—in private they were as successful as, or more so than men—brought the total loss up to 6.6 per cent. Of the 20 failures, eleven occurred in the iridectomy series, six in the non-iridectomy, and three doubtful; even adding the last two together, the proportion of failures in the iridectomy cases was still decidedly the larger, for out of the total 301 cases, iridectomy had been performed in only about a third.

Mr. Hewetson said he had completely abandoned iridectomy. He follows the method described by Mr. Teale, and was well satisfied with the results. He is very careful as regards antiseptics, and considers as one of the sources of danger the eyelashes, which he, therefore, clips off before the operation. He also considers the saliva of the operator accidentally brought on the conjunctiva of the patient when

the operator talks, as a possible carrier of infection, especially in the not unfrequent cases where caries of the teeth exists. Prolapse of the iris was met with but very rarely.

Antiseptics in Cataract Operations.—Dr. G. A. Berry described the method he employed. He immerses the instruments in a 5 per cent. solution of carbolic acid, and, after five minutes, transfers them to a concentrated solution of boracic acid. Before, and during the operation, the conjunctival sac is washed out with a solution of 1 to 5,000 of corrosive sublimate. The results have been very favourable, but he particularly mentioned that it would be very dangerous to rely too much on the salubrious effect of antiseptics alone. In some instances suppuration *will* occur. The inoculation through instruments can be readily and completely avoided; it therefore remains to diminish the risk of inoculation from sources within the eye. This ought to be obviated (1) by frequent washing of the wound during operation, (2) by making the corneal wound as clean a cut as possible. The knife ought to go clean through the cornea, and sawing movements should be avoided. (3) The bruising of the clean cut surfaces during extraction ought to be carefully guarded against.

The danger from septic inflammation of the iris is less easily overcome by the usual antiseptic methods, probably because germs once introduced cannot be so readily removed from within the anterior chamber as from the open surface of the corneal wound. The observation that simple is scarcely ever followed by septic inflammation, indicates to us the performance of a preliminary iridectomy as the best mode of avoiding septic iritis.

Dr. Bronner exhibited a hook for removing remains of lens capsule (a slight modification of the sharp lens hook).

Dr. Little said he had been brought up in the iridectomy school. He had operated on a great many cases, and had always obtained excellent results. He well knew the dangers of the old operation, but he did not know the advantages of the new over the old method. Mr. Teale had not given his results. Nor had Mr. Snell done so with sufficient details, as he did not give his cases of iritis, nor the state in which he left the eye finally. From his last 300

cases Mr. Snell did not show how often the final results were obtained only by secondary operations. In 1872 or 1873 Lebrun and Liebreich had done the same operation which Mr. Teale does now. From his own experience of this operation the results had been thoroughly unsatisfactory, and he had soon abandoned it. That was years ago. Now, of course, the introduction of cocaine, eserine, and antiseptics had made a change. But, still, Dr. Little did not adopt extraction without iridectomy for the reason that he did not anticipate results more satisfactory than hitherto obtained, considering that he had not lost more than one case in his last 200 operations.

Within the last six weeks he had done fifteen cases without iridectomy, as he desired to give this method a fair trial. He had one prolapse of the iris, five cases of anterior synechiæ (usually small), the others did well.

Dr. Mules remarked that some years ago Dr. Meyer, of Paris, had given it as his opinion there are cases in which even the strictest antisepsis was unavailable, and where the patients seem to carry the source of infection in themselves. As to the mode of operation, Dr. Mules would like to put to every one present the question which method he would select in case his own eye had to be operated upon. He thought every member of that section would decide upon a preliminary iridectomy, to be followed some weeks later by extraction.

Dr. Bell expressed himself in favour of iridectomy.

Mr. Mackinlay had seen a series of cataract extractions without iridectomy, but he was not at all satisfied with the results obtained. He preferred iridectomy, and, if possible, a preliminary one. His results quite coincided with those of others who had had a large experience, such as the late Mr. Critchett and Dr. Little. The iridectomy is the best safeguard against the risks of prolapse, of anterior synechiæ, and of iritis, suppurative or otherwise, and of the still more dangerous prospect of a future glaucomatous attack, or of sympathetic mischief.

Dr. Grossmann said he could only repeat what he had stated last year at Glasgow. He had quite abandoned iridectomy, and had had no reason to be dissatisfied with his

results. The "new" operation was certainly not more difficult than the old method with iridectomy. Concerning the bruising of the iris by stretching, he had never seen any ill-effects, although he had been brought up to consider this danger a serious one. Cocaine and antiseptics had rendered the operation thoroughly reliable, whereas some years ago it had been a most hazardous one. He thought too much importance had been attributed to the cosmetic effect of a circular pupil. He could, however, not omit to mention the great comfort patients derived from a movable round pupil. It enabled them to face the light much more freely and to see much better than when the iris had been mutilated, and it often helped considerably to correct the astigmatism.

If most of those present would to-day, in the case of their own eyes, decide for an operation with iridectomy, it by no means followed that this would be the same ten or twenty years hence, when this so-called "new" method would have had a fair and impartial trial, when everyone had become more familiar with it, and its advantages and shortcomings would be more clearly recognised by all.

Mr. Cross drew attention to the fact that Continental surgeons have gradually abandoned, with few exceptions, the old operation with iridectomy. His own opinion was that iridectomy should be preferred because the lens, and especially the cortical *débris*, can be cleared out so much more easily if the corneal wound is in direct communication with the capsule. Furthermore, the risk of anterior synechiæ is far greater without iridectomy. And to leave an anterior synechia is certainly a dangerous thing; the iris acts then as a foreign body in the cornea, and iritis, and even septic iritis, may be the result. The cosmetic effect is of no weight in the matter.

Mr. Doyne spoke in favour of dismissing the fixation forceps altogether.

Mr. Cant had tried his last 15 cases without iridectomy, and was thoroughly satisfied with the result. He does not use any speculum.

Mr. Frost said he was in favour of the old method. He had operated in a small number of cases without iridectomy,

but was not satisfied. His principal objection is the stretching and bruising of the iris, unless the wound is made near the centre of the cornea, to which there are obvious objections. Another difficulty is the clearing out of the *débris* of the cortex, which are apt to get out of sight and out of reach behind the iris. The pupil may be quite black immediately after the operation, but a few days afterwards cortical masses may have completely filled the pupil and perhaps set up iritis. He also thinks too much importance has been given to the cosmetic effect.

Mr. W. J. Collins thought the destruction of septic organisms by antiseptic irrigations by no means a certainty, the possibility remaining of their being absorbed and introduced from other parts of the body. Moreover, carbolic acid and other antiseptics could scarcely be put into the eye with impunity in such strength as was required to kill those micro-organisms. He put his instruments in boiling water before operation and washed the conjunctival sac with a concentrated solution of boracic acid. He performed an iridectomy, which he considered the safest course, and his results were quite satisfactory. Extraction without iridectomy might be the operation of the future, but at the present time he did not think it gave the best average results.

The President said that when he listened last year, at Heidelberg, to the statistics of Drs. Knapp, Gayet, and Schweigger concerning cataract extraction without iridectomy, he could not but fear that something pretty and attractive might lure him into danger, and possibly to his ophthalmic ruin. A similar feeling had been revived by the papers of Messrs. Teale, Snell, and Hewetson, and he had to seek an antidote to temptation in his own past experience. He had for several years the advantage of watching his father's statistics with this operation, and the large percentage of resulting evils, such as prolapse, synechiæ, iritis, secondary glaucoma, sympathetic ophthalmitis, together with the necessity for more frequent dissection of capsule, led his father not only to abandon the procedure, but also to condemn it. He was somewhat surprised that no allusion had been made to the different varieties of cataract with which every experienced operator had to deal, and it must

at once be evident that where no iridectomy was made, the capsulotomy must of necessity be central, and could not be peripheral, as should in his opinion be the case when the cataract was immature ; and there was also the great objection that it was more difficult to thoroughly clear the pupil of soft lens substance. He felt that our best course lay in endeavouring to secure the largest measure of useful sight for the greatest number, and this was, he thought, more likely to be obtained by the operation with iridectomy. He agreed with Mr. Cross that it was better to err rather on the side of a large than of a small incision, and felt convinced that the best results would be achieved by the operator who accomplished his purpose with the least possible amount of violence to the eye. He also thought that the tendency to suppuration was peculiar to certain individuals, and could not in every instance be neutralized by antiseptics.

(*To be continued.*)

AMERICAN OPHTHALMOLOGICAL SOCIETY.

TWENTY-FIFTH ANNUAL MEETING.

Held at New London, Conn., July 17th and 18th, 1889.

President—DR. WILLIAM F. NORRIS, of Philadelphia.

Reported by DR. EDWARD JACKSON.

Simple Chronic Glaucoma.—Dr. C. S. Bull (New York) presented an analysis of 90 cases, with special reference to the effects of iridectomy upon the acuity of vision and the visual field. All cases of this class were included, in which he had been able to follow the course of the affection for a year or more after operating upon them. There were 44 men, 46 women. Ages ranged from 24 to 86 years, in the decade from 20 to 30, 2 ; from 30 to 40, 7 ; 40 to 50, 16 ; 50 to 60, 21 ; 60 to 70, 33 ; 70 to 80, 4 ; 80 to 90, 4. Of these patients, 77 were Christians, 13 Hebrews. In 64 there was clear no history of an interval between the involvement of the first and second eye, in 26 the interval varied from two months to twelve years. In 122 eyes the lens was clear ; in 18 there was somewhat advanced cataract ; in 35 there were peripheral opacities, and in 20 of these they increased

more rapidly after the iridectomy. Detailed histories of the cases were appended.

The conclusions arrived at are : 1. After laying before the patient or his friends the certainty of blindness without operation, the probability of blindness in spite of it, as advised by Priestley Smith, it seems to be our duty to operate in cases of chronic progressive glaucoma, and the earlier the better. 2. If the disease seems stationary in the primary stage, it is permissible to delay operating; use a weak solution of eserine or pilocarpine daily, and carefully test the vision and visual field at short intervals. 3. If the disease exists in both eyes, but with useful vision in both, the eye in which the disease is more advanced should be operated on at once; and the result will guide the surgeon in his treatment of its fellow. 4. To insure the best result the incision should be made well in the sclerotic and the entire iris from one end of the incision to the other carefully torn or excised from its insertion. 5. The best iridectomy is sometimes followed by rapid loss of remaining sight, sometimes partial, sometimes total. 6. A successful result is more likely to follow early operation, but the maintenance of existing vision even in these cases is not invariable. 7. In probably 80 per cent. of the cases the disease is sooner or later present in both eyes. There can be no specific interval which insures the second eye against an attack. 8. If the patient is old and feeble, and one eye free from disease, a year or more after the other has become affected, it is prudent to avoid an operation. 9. The condition of the field of vision is no constant guide either in forming a prognosis as to the progress of the disease, or in deciding as to the time for operation. 10. The acuity of vision bears no constant relation to the success or failure of the operation. 11. The anterior chamber is usually shallow, is occasionally entirely absent, but is often apparently normal in depth. Its condition gives no reliable hint as to the state of vision or the visual field, nor any indication as to prognosis. 12. The appearance and motility of the iris seem to have some bearing on the prognosis. In the majority of cases in which eserine caused rapid contraction of the pupil, the visual acuity was fairly good and the field was not seriously

limited. 13. The depth of the excavation in and the colour of the optic disc seem to have no close connection with the defective vision or with the limitation of the field ; nor do they offer any constant guide as to prognosis, or to the effect of an operation on the progress of the disease. 14. The intra-ocular tension is a very uncertain guide in deciding the time for operating. It may be normal, increased, or even diminished. It does not even seem to bear any constant relation to the degree of visual acuity, or to the state of the visual field. The steady maintenance of increased tension, however, almost invariably indicates the necessity for an immediate operation, especially if it is continuously rising. 15. The health and age of the patient influence decidedly the effect of the operation. Marked evidence of senility is distinctly unfavourable.

Dr. H. Knapp had seen 670 cases, 226 of which were chronic simple glaucoma. One-third had been in Jews, that race furnishing only about one-fifth of all his patients. As to prognosis, he would in general agree with Dr. Bull, except that he would make it a little more favourable. He had encountered 4 cases of malignant glaucoma, and in two of these he had unfortunately operated on both eyes. From his scant experience he was inclined to think that malignant glaucoma was more likely to occur in comparatively young persons. He believed cystoid cicatrix to be due to inclusion of the stump, or a part of the ciliary body in the wound, when made very far in the periphery. Pilocarpine and eserine in time lose their effect ; they should be used only during exacerbations. In prognosis, he is guided mainly by the condition of the iris. Where there was a deep excavation of the optic disc, but with good vision and no limitation of the visual field, he would delay the operation. It is very essential to effect a complete reduction of the edges of the coloboma. When this has been accomplished it is sometimes evident that less iris has been removed than was supposed. We should also guard against making the incision too peripherally.

Iridectomy in Glaucoma.—Dr. E. Gruening (New York) would divide cases of glaucoma into five classes : 1. The acute inflammatory. 2. The chronic inflammatory without

organic degenerative changes. 3. The chronic inflammatory with serious organic changes. 4. The simple chronic form. 5. The intermittent. In the first of these classes, iridectomy gives brilliant results; in the second, the results obtained by it are generally satisfactory; in the third, neither iridectomy nor anterior sclerotomy is beneficial—posterior sclerotomy may be; in the fourth class, iridectomy should be done in all cases, as early as possible, with the hope of preserving what vision remains; in the fifth, operative interference has proved disastrous. In three cases of iridectomy for acute glaucoma an attack in the other eye had followed in twenty-four hours. Two had been cured by iridectomy, and the third by the use of eserine. The prolonged use of eserine had caused posterior synechiæ.

Dr. S. O. Richey regarded glaucoma as the local expression of general conditions of the vascular and nervous systems. He supplemented the local use of eserine by galvanism of the cervical sympathetic.

Dr. Knapp had repeatedly seen, after an iridectomy, an attack of glaucoma in the other eye. Generally it had yielded to eserine.

Dr. Bull: Eserine in solutions stronger than one-half grain to the ounce is liable to cause iritis in eyes either healthy or diseased. In the strength mentioned he had never seen it fail of its action. Stronger solutions should not be used.

Dr. S. Theobald had seen a case of acute glaucoma cut short by eserine, and no recurrence in several months.

Dr. B. A. Randall could testify to the value of weak solutions of eserine; he had used them with success to relieve pain in absolute glaucoma. He had seen increased opacity of the lens following iridectomy with rather persistent efforts to free the anterior chamber of blood.

Dr. S. D. Risley had found a solution of eserine one-thirtieth of a grain to the fluid ounce of water, to cause a distinct sense of movement in the lid, and when its instillation was continued for two days, a brow ache. Solutions of this strength are distinctly beneficial when stronger solutions would not be borne.

Dr. J. A. Lippincott had in one case of iridectomy for

glaucoma left the sphincter of the iris uncut. At the end of six years there was no farther deterioration of vision.

Dr. H. D. Noyes called attention to the fact that in glaucoma there might be scotoma without marked impairment of the peripheral field of vision. In a case of this kind on which he had operated ten years ago, there had been from time to time a slow increase of the scotoma. But the man, who was a lawyer, still saw sufficiently well to carry on his business as usual. In certain cases of early glaucoma associated with high refractive errors, and evidence of great accommodative strain, the use of the needful correcting lenses, and the keeping of the accommodation quite in abeyance with atropia, had given entire relief. Since intermittency is a characteristic of simple glaucoma, he would not place intermittent cases in a class by themselves. In some cases of chronic simple glaucoma, large doses of strychnia have caused temporary improvement of vision. He has gradually withdrawn from the extremely peripheral location of the incision to avoid the serious danger of causing cataract by pressure of the knife, although the point did not come in contact with the lens.

Dr. W. W. Seely found the extremely peripheral position of the incision not necessary. He had also obtained as good results from small iridectomies as from large. As to eserine, failing to get the desired results with weaker solutions, he had for years used a solution of four grains to the ounce. This was instilled once a day, or oftener. He had not seen iritis produced by it; the pain it caused was not severe, and had not in any case made it necessary to suspend its use.

Dr. Knapp had seen good effected by posterior sclerotomy. In one case it had given relief from pain in a sightless eye, after iridectomy had failed.

Dr. A. Mathewson found strychnia of great benefit after iridectomy.

Dr. S. B. St. John had twice done iridectomy for glaucoma without cutting through the sphincter of the iris. He had been struck with the prompt retraction of the iris from the angles of the wound in both cases. Both had done well.

Dr. H. W. Williams could remember that, before the introduction of iridectomy, no good results were obtained

in the treatment of glaucoma. The brilliant success of the operation in acute inflammatory cases had led to its employment in cases in which it was of doubtful utility. And when used in these latter and followed by blindness, although the patient might understand that his case was hopeless from the start, the general public could not be expected to draw nice distinctions, and would, by reason of such failures, be indisposed to submit to operation even in the most favourable cases.

The Use of the Curette in Cases of Inveterate Pannus.—

Dr. E. Gruening (New York) urged the use of this procedure in cases in which, after the complete disappearance of trachoma granules from the conjunctiva, the cornea still remained cloudy and vascular. It consisted in scraping away the epithelium and adjoining hazy tissue and vessels, following the latter well up on the margin of the conjunctiva. The instrument employed was an ordinary spud, for the removal of foreign bodies; the eye being first thoroughly subjected to the influence of a six per cent. solution of cocaine. The operation caused very little reaction. In twenty-four hours the surface was covered with a dense greyish membrane, which was easily removable or would separate spontaneously. The healing was complete in two or three weeks. He had resorted to this method of treatment in eleven cases. In three, a second scraping had been required. In all, the final result had been great improvement in vision, and in every way satisfactory.

Dr. S. B. St. John, having heard of Dr. Gruening's plan of treatment, had tried it in one case. The result was highly gratifying.

Corneal Abscess.—Dr. H. F. Hansell (Philadelphia) read a paper in which he called especial attention to the use of eserine in this affection and in corneal ulcer. Any danger from a contracted pupil may be guarded against by the simultaneous use of atropia, as these drugs are not for this purpose at all incompatible. He also protested against a routine use of cocaine in these conditions, believing that cocaine had no place in the therapeutics of the cornea.

Malarial Keratitis.—Dr. C. J. Kipp (Newark) presented a communication supplementary to his first paper on the

subject, which he had read before the Society in 1880. The present one was based upon 130 cases, observed in the intervening nine years. Most of them occurred between the ages of 20 and 50. Two-thirds of the patients were males, and 62 per cent. occurred during the spring and summer months. A history of one or more previous attacks was given in 25 per cent. of the cases. All but five presented the characteristic superficial, narrow, branching ulcer described in his former paper. In some there were multiple ulcers. Some were accompanied by intense neuralgic pain; in a few there was impairment of the corneal sensibility. Under anti-malarial treatment repair was usually rapid. The opacities remaining were not dense, but often quite persistent. Subsequent attacks occur in connection with relapses of the malarial fever. During the period covered by the paper a dozen cases of such an ulcer had been seen in persons free from malarial fever; so that the ulcer could not be regarded as pathognomonic. He believed it was the same lesion that Hansen Grut and Emmert had described as mycotic, without allusion to a malarial origin. Touching the surface of the ulcer with a 1 per cent. solution of silver nitrate had proved the most satisfactory local treatment. Where this failed the actual cautery had in all cases checked the course of the ulcer.

Dr. H. D. Noyes found a superficial keratitis, associated with tenderness of the supra-orbital nerve and anæsthesia of the cornea, always connected with malarial fever. He did not believe the descriptions of Grut and Emmert referred to the malarial cases at all. In the mycotic ulcer, careful scraping away of the involved tissue had proved quite effective.

Dr. T. Y. Sutphen had watched these cases since Dr. Kipp first drew his attention to them, fifteen years ago, and he was convinced of their malarial origin. When subsequent attacks occur they are usually lighter than the first.

Dr. John Green had seen a great number of cases of superficial keratitis following acute malarial fever.

Dr. E. Gruening, in the form of superficial branching ulcer alluded to, had always found the teeth coated with tartar, and a habit of transferring saliva from the mouth to

the eyes. He regarded it as mycotic. Generally it yielded to scraping, but not always.

Dr. H. Knapp said that superficial keratitis is often a symptom of syphilis, and yields to anti-syphilitic treatment, and to that only.

Dr. Kipp had no doubt of the mycotic nature of this affection; neither had he any doubt about its connection with malarial fever.

Dr. H. G. Miller ascribed this form of corneal ulcer to malaria. It had appeared in the locality of his practice, simultaneously with the occurrence of malarial fever, from which that region had previously been free.

Irrigation of the Anterior Chamber.—Dr. J. A. Lippincott (Pittsburgh) had used syringing of the anterior chamber in fifteen cases of cataract extraction to remove retained cortex and blood. He had also used it with great advantage in cases of severe inflammation, with the anterior chamber filled with thick pus. His experience showed that it was a valuable resource, attended by no serious inconvenience. The syringe for this purpose should be simple, easily kept clean, easily handled, should allow perfect control of the force of the injected stream, and should throw no air into the eye. To meet these requirements he had devised a special form of reservoir or fountain syringe, which he exhibited. The reservoir and point are of metal, so that they are readily disinfected by heat; and they are connected by rubber tubing, easily renewable and perfectly flexible, so that it allows perfect control of the nozzle. The flow of fluid is controlled by a spring clip; and its force by the height to which the reservoir is raised above the eye. The fluid should enter the eye at a little above blood heat, and a thermometer was attached to indicate its temperature. The fluid used was distilled water.

Dr. E. Gruening doubted if this syringe could be very readily kept clean. He was accustomed to use the simple glass "undine" proposed by Alfred Graefe.

Dr. D. Webster exhibited the *Skeleton of the Eye of a Sword Fish*. Dr. H. D. Noyes showed a *Spectacle Frame*, to which were attached the nose pieces of a pince-nez, to help bear the weight of exceptionally heavy glasses.

(To be continued.)

INTERNATIONAL MEDICAL CONGRESS, 1890.

We have been asked to place before our readers the following intimation :—We, the undersigned, do hereby give notice that, according to the resolution passed at the Washington meeting, September 9th, 1887, the Tenth International Medical Congress will be held in Berlin. The Congress will be opened on the 4th and closed on the 9th day of August, 1890. Detailed information as to the order of proceedings will be issued shortly. Meanwhile we should feel sincerely obliged if you would kindly make this communication known among your medical circles, and add, at the same time, our cordial invitation to the Congress.

VON BERGMANN.

VIRCHOW.

WALDEYER.

 RECENT LITERATURE.

A. RETINA. OPTIC NERVE. CENTRES.

BECHTEREW. Sur la voie de transmission de l'irritation lumineuse de la rétine sur le nerf oculo-moteur.

Arch. de Psychiatrie, Neurologie, &c., t. XIII. 1889.

BUEL. De la névrite rétro-bulbaire.

Arch. d'Ophthal., July—August, 1889.

FITOW. Anomalie de l'artère centrale de la rétine.

Vestnik Ophthalmol., May—June, 1889.

FULTON. Some cases of monocular neuro-retinitis.

Arch. of Ophthal., XVIII. 2.

HORSTMANN. Specific Optic Neuritis (Translation).

Arch. of Ophthal., XVIII. 2.

NICKELS. Ein Fall von Cilioretinalem Gefäss.

Kl. Mon. Bl. f. Augenheilk., August, 1889.

NIEDEN. Globular Formations in and around the Optic Nerve (Translation).

Arch. of Ophthal., XVIII. 2.

RAEHLMANN. Ueber miliare Aneurysmen an den Netzhautgefäßen und Netzhautblutungen.

Kl. Mon. Bl. f. Augenheilk., July, 1889.

ROLLAND. Un cas de Gliome de la Rétine.

Rec. d'Ophtal., July, 1889.

SACHS. Anatomical and clinical contributions to the knowledge of Central Scotoma in affections of the Optic Nerve (Translation).

Arch. of Ophthal., XVIII. 2.

SAMONILOW. De la fatigue de la rétine par les couleurs.

Thèse de Doctorat, St. Petersburg, 1888.

SEGGEI. Die ophthalmoscopischen Kennzeichen der Hirnsyphilis.

Deutsch. Arch. f. Klin. Med., XLIV. 4.

B. UVHAL TRACT. VITREOUS AND AQUEOUS. LENS

CRITCHETT. The Treatment of Immature Cataract. Address in the Ophthalmological Section of the British Medical Association.

Brit. Med. Journal, August 24, 1889.

HACHE. Sur l'Hyaioide et la Zone de Zinn.

Recueil d'Ophtal., July, 1889.

KNAPP. On division of the Capsule during the Corneal Section in Extraction of Cataract.

Archives of Ophthal., XVIII. 2.

RANDON. Résultats de 140 Opérations de Cataracte.

Recueil d'Ophtal., July, 1889.

D. ACCOMMODATION. REFRACTION. MOTOR APPARATUS.

AHRENS, R. & A. Neue Versuche ueber anisomorphe Accommodation. Bevorwortet von W. von Zehender.

Klin. Mon. Bl. f. Augenheilk., August, 1889.

GÜNSBURG. Zur Casuistik der angeborenen Muskel-anomalien.

Klin. Mon. Bl.f. Augenheilk., July, 1889.

MADDOX. The clinical use of Prisms.

Hamilton, Adams & Co., London, 1889.

NEONIMINE. Sur la différence dans le degré de la myopie et de l'hypermétropie selon qu'on les détermine sur un seul œil ou sur les deux à la fois.

Congrès des Med. russes, January, 1889.

E. EYELIDS. LACRIMAL APPARATUS. ORBIT.

HOUCIN. Du Ptosis.

Thèse de Doctorat, 1889.

LAWFORD. Cases of Orbital Cellulitis and Orbital Abscess.

Lancet, August 10th, 1889.

TRUC. De l'extirpation des glandes lacrymales orbitaires dans les larmoiements incoercibles chez les granuleux.

Arch. d'Ophthal., July—August, 1889.

VALUDE. De la restauration des Paupières. Désavantages de la greffe cutanée.

Arch. d'Ophthal., July—August, 1889.

F. MISCELLANEOUS.

ADAMÜK. Deux cas de Glaucome dans les yeux apha-kiques, avec quelques remarques sur son étiologie.

Vestnik Ophtalmol., March—April, 1889.

ADAMÜK. Contribution à la pathologie du nerf sympa-thique.

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Archives of Ophthal., XVIII. 2.

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N. Y. Med. Record, August 3rd, 1889.

FAGE. Contribution à l'étude des hæmorrhagies intra-oculaires consécutives à l'extraction de la cataracte ; examen histologique.

Arch. d'Ophtal., July—August, 1889.

GASPARRINI. Innesto di congiuntiva e cornea di cane in un caso di sinblefaron con attecchimento immediato e successiva atrofia.

Annali di Ottalmologia, Fascic. III., 1889.

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Vestnik Ophtalmol., May—June, 1889.

LOGETSCHNICOW. Sur les indications de l'iridectomie et de la sclerotomie dans le Glaucome.

Vestnik Ophtalmol., March—April, 1889.

MOTAIS. De l'hérédité de la myopie.

Arch. d'Ophtal., July—August, 1889.

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Ann. di Ottalmol. Fascic. III., 1889.

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Archives of Ophthal., XVIII. 2.

SERGUIEW. Un cas de Sclerophthalmie double.

Wratch. 1889.

**LOZHETCHNIKOFF (Moscow).—On the Indications
for Iridectomy and Sclerotomy in Glaucoma.
(*Vestnik Ophthalmologi*, April, 1889).**

During more than half the time that has elapsed since the operative treatment of glaucoma became a recognised practice, attention which at first was directed almost exclusively to the excision of the iris—to iridectomy—came to be given also, through the initiative of Quaglino, to the first step in that operation—the external incision. The operation of sclerotomy has for almost twenty years come in a manner into competition with the older iridectomy for glaucoma. There are probably at the present time few who do not believe that the greatest and most lasting benefit to be derived by operation is afforded by iridectomy. There are not many, however, whose experience of both operations is sufficiently large to justify their forming any decided opinion as to whether or not there is a reasonable indication for performing sclerotomy in preference to iridectomy in some forms of glaucoma. It will be evident to most that this is a point which can only be settled by experience, and not, in the present state of our knowledge regarding the true nature of the disease or diseases to which the name of glaucoma is given, by any pre-conceived idea of its pathology. Statistics collected from various sources are, in respect to operations for glaucoma, at best somewhat unsatisfactory, and cannot be compared in value with those in which one individual operator is able to contrast his own results after a sufficiently large experience of different methods of operation. Statistics of this nature, giving the author's views as to the indications for the performance of iridectomy and sclerotomy, have lately been published by Lozhetchnikoff, of Moscow.

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In over 1,000 operations for glaucoma which he had performed, he employed the method of sclerotomy 284 times, that of iridectomy the remaining 700 odd times. (The exact figure is not given in his paper.) Whatever view one may be disposed to take oneself, it is certain that so extensive an experience well deserves consideration. All the more so is this the case as, although we have important statistics by Horner and others on the results obtained by iridectomy, such statistics are rather conspicuously absent in the case of sclerotomy.

The method of performing sclerotomy adopted by L. was almost exclusively the double incision by transfixing, Wecker-Mauthner's operation or *sclerotomia duplex*. This operation he performed 257 times; of the remaining 27 cases, 17 were done by Quaglino's method (simple sclerotomy), 6 by cicatrization, and 4 by transverse sclerotomy (Maklakoff). The results obtained are given in a series of tables, a separate table being devoted to each form of glaucoma.

TABLE I.—*Acute glaucoma*. 8 cases.

Results: In 4 T. reduced, V. improved, subsidence of inflammatory (congestive?) symptoms.

(In two of these iridectomy subsequently required, and result successful.)

In 3 T. reduced, V. *in statu quo*. (In all subsequent successful iridectomy.)

In 1 considerable improvement of all symptoms (after 2 years V=0.)

TABLE II.—*Chronic inflammatory glaucoma*. 68 cases.

In 25 T. reduced to normal or lower, V. improved. (In 5 of these the improvement in vision was very considerable. In 5 others the effect of the operation was observed to last from 1 to 5 years. In other 5 subsequent dilatation, *i.e.*, excision of peripheral portions of iris leaving pupillary margin was required.)

In 15 T. reduced, V. *in statu quo*. (In one case subsequent iridectomy, effect of which observed to remain good during 14 years.)

In 11 *status quo ante*.

In 1 T. not reduced, V. improved. (Subsequent iridectomy T. reduced.)

In 15 T. not increased, V. worse.

In 1 T. increased, V. worse.

TABLE III.—*Absolute glaucoma, i.e.*, according to L., glaucoma with degenerative changes, and vision nearly or completely abolished. 93 cases.

In 5 T. reduced, V. improved.

In 24 T. reduced, V. *in statu quo*. (In 2 of these effect observed to last 2 years; in 1, 3 years; and in 1, 5 years. In one other case operation combined with dilatatorrectomy owing to prolapse of iris.)

In 39 T. reduced but not to normal, V. *in statu quo*.

In 8 no alteration in T. or V., but pain checked.

In 5 T. reduced, but pain continued.

In 10 no change in either T. or V.

In 2 T. increased and pain set up.

TABLE IV.—*Incipient glaucoma*. 71 cases.

In 31 T. reduced to normal, V. improved. (In one the effect continued 6 years, the V. worse, and T. + 2. In 9, deteriorations observed after 1 to 3 years.)

In 15 T. reduced to normal, V. *in statu quo*.

In 2 T. not reduced, V. improved. (In one, T.n. at time of operation.)

In 5 *status quo ante*.

In 14 T. not reduced, V. worse. (In 9 of them, though T. never rose, V. slowly deteriorated.)

In 4 T. increased, V. worse.

TABLE V.—*Glaucoma simplex*. 11 cases.

In 4 T. reduced to normal, V. improved.

In 4 T. considerably reduced, V. as before.

In 3 T. as before, V. worse.

This table also includes 3 cases of congenital hydrophthalmus, and 3 of secondary glaucoma, for which sclerotomy (duplex) was performed.

Hydrophthalmus.—In 1 T. reduced to normal, V. *in statu quo*.

In 1 T. considerably reduced, V. improved; and

In 1 T. reduced to normal, V. worse.

Secondary glaucoma.—In 2 (scleractasia intercallaris) T. reduced to normal, V. *in statu quo*.

In 1 *status quo ante*.

Of the 17 cases for which simple sclerotomy was performed a very good result was obtained in 8 (3 absolute, 2 acute, 2, chronic, and 1 simplex). In 2 cases (1 chronic, 1 simplex) the result was good. In 3 *status quo ante*, and in 4 (1 chronic, 3 simple, without T +) V. worse after operation.

Of the 6 cases of cicatrization again, performed for recurrence of glaucoma after iridectomy, 1 case was followed by an excellent, 3 by a good, and 2 by an indifferent result.

Finally, in the 4 cases in which transverse sclerotomy was performed, the result was good in one of chronic glaucoma, without any effect in two cases, and very bad in the remaining one.

As regards accidents resulting from the operation of duplex sclerotomy, prolapse of iris occurred in all 18 times; in 14 of these dilatatorectomy was performed. In 3 cases there was displacement of pupil without prolapse.

The author does not give any statistics as to the results of his iridectomies, but in comparing the two operations of sclerotomy and iridectomy comes to the following conclusions:—

1. In all forms and stages of glaucoma, except the prodromal stage, one or other operation is indicated.

2. Neither is capable of radically curing the process, but may check it for a longer or shorter time.

3. The operation (sclerotomy?) may be repeated with advantage an indefinite number of times.

4. In certain cases (which can probably not be diagnosed) an operation has a bad effect, either leading to increased intra-ocular tension, or to atrophy, preceded by hæmorrhage into the vitreous, detachment of the retina, etc.

5. Experience shows that there is an indication for one or other operation afforded by the particular form and stage of the disease.

6. Generally speaking, iridectomy is the more hopeful operation, as its favourable influence has been longer known, and found to last longer.

7. Iridectomy is indicated and most successful in

chronic and sub-acute forms of glaucoma, as evidenced by various statistics.

8. There are cases in which it is incomparably more difficult to perform iridectomy, and in which, at the same time, a technically perfect operation is of the utmost importance to secure success. Such are cases of acute glaucoma and absolute glaucoma, with acute exacerbations. In these sclerotomy is markedly preferable.

9. But the action of sclerotomy in acute glaucoma is for the most part merely a preparatory one ; iridectomy is generally required in addition when the sub-acute stage is reached as a consequence of the first operation.

10. Owing to cosmetic and optical advantages sclerotomy is preferable, and therefore to be selected when an operation is indicated in the initial stage of the disease.

11. Sclerotomy is indicated in simple glaucoma.

12. Sclerotomy is indicated in all cases where there is a danger of escape of vitreous, as in hydrophthalmus.

13. Iridectomy is preferable in all cases of secondary glaucoma, due to anterior or posterior synechiæ and cystoid cicatrix.

14. The duplex operation is the best when sclerotomy is performed.

15. Snellen's proposal to perform iridectomy, leaving the pupillary margin intact (dilatatorectomy), deserves attention, and may be expected to give good results combined with sclerotomy (sclero-dilatatorectomy !)

16. Myotics are useful, both alone in the premonitory stage, and as a means of facilitating operations in other stages. Pilocarpine especially is of value in the first operative stage of treatment.

GEO. A. BERRY.

F. PETERSON (New York). Electric Cataphoresis as a Therapeutic Measure. *New York Medical Journal*, April 27, 1889.

The author of this paper, who is chief of a clinic for nerve diseases at the College of Physicians and Surgeons, has made some interesting and important experiments on the production of local anæsthesia by cocaine and aconitine, in conjunction with the continuous electric current—a revival of a principle which has occupied the attention from time to time of many other experimenters.

If two compartments separated by a membrane are filled with a fluid, and in each an electrode is placed, there is a streaming of the fluid through the septum in the direction of the galvanic current—that is, from the positive to the negative pole; so that in the course of time there is an increase of fluid in the negative compartment. A similar osmosis occurs without the use of electricity between two dissimilar liquids, the direction of the osmotic current being from the lighter to the denser liquid; but if the anode be placed in the denser liquid and the cathode in the lighter, this natural osmotic current is not only overcome, but reversed. Dubois-Raymond termed this the cataphoric action of the constant current.

The skin of animals is permeable by drugs in varying degrees in different animals, and according to the nature of the drug employed and the manner of its application to the skin. Thus, the skin of the frog absorbs water and watery solutions rapidly, while that of man is unable to do so, because of the fat present upon the epidermis and in the pores. Solutions containing alcohol, ether, or chloroform, by removing the fat, render absorption easier. Substances which are volatile and corrode the epidermis, like carbolic acid, are readily absorbed; and when the epidermis is removed by an abrasion, burn, or blister, the transference of substances through the skin is rapid. Massage in connection with cutaneous medicaments causes easy absorption by forcing the particles into the pores.

The cataphoric action of electricity has often been made use of experimentally to introduce drugs into the system

through the skin. The anode, moistened with a solution of strychnine, has been applied to the skin of a rabbit, the cathode being placed upon any indifferent spot, and in a few minutes the animal has died from strychnine poisoning. In man, quinine and potassium iodide have been thus introduced, and subsequently detected in the urine.

Several experimenters have attempted to utilise the same principle for the production of local anæsthesia. In two papers on "Voltaic Narcotism," published in 1859, B. W. Richardson described some experiments in which with a galvanic current and with tincture of aconite on the positive pole, he produced complete anæsthesia after failing to do so with the current alone. Applying chloroform and aconite in a similar manner, he anæsthetised the leg of a dog and performed a painless amputation. Later, he produced sufficient anæsthesia in the human subject for various operations, such as removal of small tumours, extraction of teeth, and relief of strangulated hernia. These results were severely questioned and criticised, and Richardson himself subsequently abandoned the position he had taken with regard to voltaic narcotism. Since that time the subject has more than once been revived, but without any permanent result.

Peterson's experiments with electric cataphoresis extended over many months, and were more than a hundred in number. In order to make certain that neither of the two agents employed is able by itself to produce the anæsthesia, he experimented first with strong solutions of cocaine alone, and then with the electric current alone, making the application to the skin of his own hand. No anæsthesia was produced in either case. Then, using the same apparatus as before, he soaked the metal sponge-covered anode, 2 cm. square, in the 10 per cent. solution of cocaine, and applied it for five minutes, with sixteen cells of a Grenet battery. Complete anæsthesia to touch, pain, and temperature, was produced in the area covered by the electrode, and persisted for more than an hour. The same experiment was then twice made on the hand of a medical colleague, with the same result. When the current was reversed, so that the application of the cocaine was made by the cathode instead

of the anode, a very different effect was produced : continuous increase of pain in area of contact, and no anæsthesia.

Encouraged by these trials, Peterson next experimented on a case of obstinate and severe right supra-orbital neuralgia. Patient, a woman aged 40 ; duration of neuralgia, a year and a half ; previous treatment unavailing ; agonising pain every few minutes ; slight analgesia over right half of forehead and nose, but hyperæsthesia of tactile sense in same area, so that a slight touch or breath of air was painful ; great tenderness on pressure. The 2-cm. square anode, wetted with 10 per cent. cocaine solution, was placed on the supra-orbital region, and the cathode in the right hand. The application lasted ten minutes. The expected anæsthesia was produced, and the pain was completely relieved for four or five hours. Subsequent applications gave similar relief, on one occasion for eleven hours, the longest period of perfect freedom from pain which the patient had known in a year and a half. The treatment was still being continued at the time of writing.

The next case reported was of the same kind, and received similar benefit.

In a case of inferior maxillary neuralgia, treated and reported by Dr. J. A. Booth, a similar but slighter effect was obtained.

Some further experiments were made in the same manner as before, but substituting an alcoholic solution of aconitine (4 grains to 1 ounce) for the cocaine solution. This caused, in two or three minutes, deep seated analgesia, but tactile hyperæsthesia lasting for an hour. In a case of locomotor ataxia with intense pain in the mid-dorsal region, relief was obtained by this means for eight or nine hours, the area covered by the anode being completely anæsthetic for an hour.

In a case of double trigeminal neuralgia, cataphoresis with a mixture of cocaine and aconitine gave complete relief for several hours, and further experiment proved that neither the current alone, nor the mixed solution alone, had an anæsthetic effect.

Cataphoresis with chloroform was found to be inapplicable by reason of the vesication and sloughing produced.

The author draws the following conclusions:—The cataphoric action of the constant current is beyond doubt or question. With cocaine, or with cocaine and aconitine, on the anode, a deep anæsthesia may be produced sufficient for the relief of pain in superficial nerves, or for small operations such as the removal of cutaneous growths, or the electrolysis of hair roots. The anæsthesia may be induced rapidly by the use of a strong current—an advantage in neuralgias—or slowly with a current imperceptible to the patient. Cocaine cataphoresis is particularly beneficial in neuralgias of the trigeminus. Wherever and whenever the electric current is employed for the relief of pain, its efficacy will be increased by moistening the anode with a ten to twenty per cent. cocaine solution. Rubbing the skin previously with alcohol or chloroform to remove the oil globules will hasten the effect.

P.S.

BRITISH MEDICAL ASSOCIATION.

FIFTY-SEVENTH ANNUAL MEETING, HELD AT LEEDS.

SECTION OF OPHTHALMOLOGY.

GEORGE ANDERSON CRITCHETT, F.R.C.S., EDIN., President.

Reported by KARL GROSSMANN, M.D.

Wednesday, August 14th.

[Continued from page 277.]

The Composition of the Human Lens in Health and in Cataract, and its Bearing on Operation for the Latter.—Mr. W. J. Collins read a paper describing an interesting research on this subject. It will be published in the next number of the *Ophthalmic Review* with fuller details than can be given in this report.

Criticisms of the Tests for Colour-blindness Employed by the Board of Trade.—Mr. Bickerton designated the first two tests prescribed by the Board of Trade, viz., the naming of coloured cards and glasses, as utterly useless, and advocated

the adoption of the third (Holmgren's) test as a crucial one, superior to all others for accuracy and rapidity. The present regulations did not prevent colour-blind pilots, look-outs, A.B.'s, or officers above the rank of second mate from continuing in their positions. He quoted from the reports of the Board of Trade forty-five doubtful cases where certificates had been granted after a previous refusal, and hoped that the Committee recently appointed by the Board would justly and efficiently deal with the question.

Notes on Tests for Colour-Blindness.—Dr. Grossmann, referring to the tests which he had laid before the meeting last year at Glasgow, regretted the unavoidable delay in their production. The criticism which had appeared in the lay press was due to some misunderstanding, as evidently the glasses for daylight and lamplight had been confounded. Holmgren's test was certainly simple and indispensable, but it was not infallible. Not long ago Dr. Grossmann had a case where Holmgren's test was well gone through by a colour-blind candidate. Two similar instances have been recorded by Prof. Pflüger. In order to avoid the slow manual reproduction of the tests shown last year, Dr. Grossmann had tried to have mechanical reproductions made on gelatine and wool. Of the latter he showed two large specimen sheets.

Thursday, August 15th.

Scleritis from Dental Irritation.—Dr. Hern reported the case of a patient, an otherwise healthy woman of 38, who experienced somewhat suddenly paroxysmal pains over the left infra-orbital nerve shooting towards the left eye. An inflamed patch on the scleral border was observed to spread downwards and outwards, the cornea becoming hazy in that part. Five months later $T + 1$, well marked pain in the upper (less marked in the lower) teeth of the left side. The second left upper bicuspid was found to be carious and removed. The pain subsided immediately, while the scleritis remained stationary for a fortnight, after which time it gradually disappeared in six weeks, leaving normal tension and $V = \frac{2}{3}$.

Peripheral Neuritis of the Ophthalmic Division of the Fifth Nerve, and its Clinical Bearings.—Dr. Mules proposed a reclassification of certain eye diseases under the name of "Ophthalmic trophoneuroses." They are all forms of nutritive change resulting from primary neuritis of the trunk, branches, or ocular ending of the ophthalmic division of the fifth nerve. The diseases he thus groups together are frontal neuritis, with herpes corneæ, lachrymal, supratrochlear and nasal neuritis, corneal herpes, solitary and multiple phlyctenulæ (like corneal affections, often associated with nasal affections), corneal ulcers, simple diffuse and chronic interstitial keratitis, essential shrinkage of the conjunctiva, scleritis, episcleritis, cyclitis and iritis (the rheumatic, gonorrhœal and gouty forms).

Discussion on the Treatment of Glaucoma.—Mr. Hutchinson, after describing his own experience concerning the causation and treatment of certain forms of glaucoma, submitted the following propositions :—

1. As a rule, a free iridectomy is the safest and best treatment for all forms of primary glaucoma.
2. It is always well to use eserine before resorting to operation. In a very small minority eserine will be found to completely relieve the symptoms, and in a still smaller the relief given by it may be permanent.
3. The continued use of eserine will very seldom suffice to prevent the recurrence of glaucomatous tension, and in any case in which, in spite of it, the sight is declining and the field contracting, an operation should be resorted to.
4. The cases in which eserine is most useful are, first, those in which the disease has been induced by atropine ; and next, those in which the disease recurs after long intervals.
5. The more nearly any case approaches to the type of acute glaucoma, the more probable it is that iridectomy will put an end to the process.
6. The more absolutely simple the case is, that is, the more entirely free from pain, congestion, perception of haloes, etc., the less is there to be hoped from an operation.
7. Cases of simple glaucoma are not as a rule benefited by the continuous use of eserine, and the choice lies between letting the disease run its course and an operation.

The progress of simple glaucoma is often very slow, and the interval is often long before the second eye is affected.

8. It follows from the last proposition, that if simple glaucoma occurs in an old person, or to one in feeble health, that the patient's sight may easily last out his life.

9. Iridectomy for simple glaucoma is often followed by immediate deterioration in sight, and advancing pallor of the disc ; with or without recurrence of increased tension. It can by no means be regarded as a harmless operation. When iridectomy is done for simple glaucoma, it should always be done very freely, and the patient should be prepared for the possibility that a second operation may be requisite.

10. In the first instance, iridectomy is preferable to sclerotomy, but if a relapse have occurred, then the latter may, in the hands of one well experienced in its performance, be a better procedure for a second operation.

11. A certain number of glaucoma cases, especially of those occurring in young adults, are in association with a definite inheritance of tendency to gout, and should be treated with reference to that fact.

12. A certain number of cases of secondary glaucoma, especially those in connection with iritis, cyclitis, etc., are susceptible of permanent relief by eserine, and do not require an operation. This remark probably applies to most cases of increased tension in association with interstitial keratitis.

13. Although, as has been admitted, the prognosis after operation for simple glaucoma is always doubtful, it is yet the surgeon's duty to resort to operation in all cases in which the disease is definitely advancing, very old patients being alone excepted.

14. If after an operation for glaucoma, recovery has once been well established, and the increase of tension completely relieved, it is very rare indeed for the disease to recur. Eyes once saved usually wear well. This remark applies to acute, sub-acute, and chronic cases.

The President, in thanking Mr. Hutchinson for his address, said he coincided in all but a few minor points. In simple glaucoma he made a medium-sized iridectomy, using a keratome, and making the incision in the sclerotic.

He made first an iridectomy, and later, if necessary, a sclerotomy, which may be often repeated (five times in one case). He preferred pilocarpine, as having a less irritating effect than eserine.

Dr. Mules made, in cases of chronic glaucoma, a very small iridectomy upwards, and as soon as possible, usually three days later, a very large sclerotomy.

Dr. Little, limiting his observations to ordinary glaucoma, remarked that one seldom sees the premonitory symptoms, which come and go, it may be for three, six, twelve months or more before leading to acute or chronic glaucoma. It was desirable to treat these cases as early as possible. He used to do this by correcting the refraction, but since the introduction of eserine he had treated cases with eserine for lengthy periods, sometimes for eighteen months; however, conjunctivitis set in ultimately. The effect was only temporary for acute glaucoma; for the chronic form it was of no use. In twelve or fifteen cases of premonitory symptoms he had done a medium-sized iridectomy upwards. Though this might be considered hasty, there was no risk with cocaine and eserine. In acute and sub-acute glaucoma he performed iridectomy with preparatory instillation of eserine. Concerning chronic glaucoma, cases are often observed where the tension increases very little; they show a nasal or a concentric contraction of the visual field. These cases he treats with iridectomy. He cannot corroborate the statement that iridectomy tends to further contract the field of vision; if well performed, it tends to check it. Anent sclerotomy, he quite agrees with Mr. Hutchinson. In previous years he performed it about thirty or forty times, but had now quite abandoned it. He ordinarily used a broad but short-pointed keratome; only in cases where the anterior chamber is very shallow or the eye lies deep, he prefers a Graefe's knife. In his opinion there is no more difficult operation than iridectomy for chronic glaucoma.

Dr. Berry remarked that glaucoma is rather rare in Scotland. He, therefore, speaks less from own experience than from observation of others. He does not find that a successful iridectomy prevents the recurrence of glaucoma.

He also used the keratome and pilocarpine. He read the statistics of Lozhetchnikoff concerning 1,000 cases, 284 of which had been treated by sclerotomy, the rest by iridectomy. (See page 289.)

Dr. Macnaughton Jones strongly advocated the use of pilocarpine in preference to eserine, which latter had produced increase of tension in some cases, and, in one instance, retinal hæmorrhage. He was greatly struck with Mr. Hutchinson's remarks about the nervous origin of glaucoma, and gave three instances in which "sudden shock" had produced glaucoma, all three in women, two after the news of death or suicide of a son, the third in a case of fire. He preferred iridectomy to sclerotomy, and did not think it a very difficult operation. According to his experience, there is plenty of glaucoma in Ireland.

Mr. Cross used myotics in simple chronic glaucoma, as long as the sight remains satisfactory; otherwise he performs sclerotomy with a keratome (very scleral and oblique). If the pupil does not perfectly contract to eserine, he would recommend iridectomy. He only uses sclerotomy as supporting the eserine, but not as replacing iridectomy, which he considers infinitely more useful. The rise of tension in interstitial keratitis, as alluded to by Mr. Hutchinson, is probably due to inflammation of the ciliary body (cyclitis) with obstruction of the filtration angle.

Dr. Hill Griffith thought the scarcity of glaucoma in Scotland, as compared with England, perhaps due to the greater frequency of gout in England. He is satisfied with the result of iridectomy in all cases except glaucoma absolutum.

Dr. Mackinlay thoroughly agreed with Mr. Hutchinson as to iridectomy in acute glaucoma. As for chronic glaucoma, he thinks the only one who seems to prefer sclerotomy to iridectomy is the Russian author quoted by Dr. Berry. Dr. Mackinlay uses a narrow linear knife, and makes a large iridectomy.

Dr. Swan Burnett said he had derived from the present discussion a greater confidence in iridectomy for chronic simple glaucoma. He believed, however, that cases of this class were often what von Graefe called "atrophy with

excavation," where iridectomy would prove absolutely useless. As to national predisposition, he had observed that the black race, immune though it seemed against trachoma and other eye diseases, had its full share of chronic simple glaucoma.

Mr. Frost, while quite agreeing with the performance of iridectomy in acute glaucoma, gave his experience of a case where he had made an iridectomy for premonitory symptoms, as advocated by Dr. Little. On removing the bandage, the sight, which had been $\frac{2}{3}$ before operation, was now barely quantitative, evidently due to hæmorrhage. He had quite abandoned sclerotomy, as unsatisfactory and uncertain. In glaucoma simplex he makes an iridectomy as soon as the field shrinks. He always uses a Graefe's knife for the operation.

Mr. Oldham has not seen any good results from iridectomy in chronic glaucoma, and has almost abandoned operation altogether. He recommends convex glasses, combined with instillation of eserine or pilocarpine, and only performs iridectomy in case of very marked exacerbation of the symptoms.

Mr. Hutchinson, in replying, remarked that as far as he followed the statistics of Lozhetchnikoff they did not give quite satisfactory conclusions. He had been impressed with several points which had come up during the discussion. Firstly, with the use of pilocarpine, which had been so highly recommended; he used eserine in weak solutions,—about $\frac{1}{4}$ grain to 1 ounce. Secondly, with the recommendations concerning repeated operations. The balance of opinion had been strongly in favour of iridectomy. In this operation he had always used a keratome of moderate size, except in very extreme cases, when a Graefe's knife became necessary. He made an iridectomy of medium size, which he thought the safest procedure, and which he would always adopt, except in cases of very old people.

Pulsating Tumour of Orbit Cured by Digital Pressure.

—Dr. Benson reported the case of a man of 38 who had been wounded on the right eyelid just above the outer canthus, and who had first noticed the eye to be prominent two months later. When first seen nine months after the

accident, proptosis was considerable, almost directly forward. Motility restricted in every direction, the lids thick and flabby, the external part of the upper conjunctival cul-de-sac filled with dark tortuous veins. No pain, no headache, vision apparently not altered. A loud pulsating bruit was heard with the stethoscope over a very limited spot. Compression of the right carotid completely arrested the bruit for the time. Digital compression of the common carotid was tried for five minutes daily for about a month, but proved of no use, till it was once tried for two and a half hours consecutively, and was borne very well. On the following day the bruit had stopped, and the eye showed a more normal appearance. Two more days' compression for two hours each completed the treatment, which was not accompanied by any disagreeable symptoms whatever. Four plaster casts, showing the changes in the appearance of the eye during treatment, were exhibited.

Dr. Hill Griffith, Dr. Bell, and Dr. Mules mentioned cases of pulsating exophthalmos.

Muscular Advancement.—Mr. Cross, after describing the anatomical relations of the capsule of Tenon, the muscle, and the tendons, answered the question when tenotomy and when advancement ought to be done in favour of the former operation in cases of excessive power of the muscle, or an elongated globe, or one unduly enwrapped within its tendon; whilst a small eyeball with a too free movement, or a weak or atrophied muscle, asks for advancement. If binocular vision cannot be hoped for, the appearance of it ought to be given at least. This will result in improvement of vision, especially if its development is encouraged by orthoptic exercises. In the operation of advancement, Mr. Cross exposes the tendon, makes a central longitudinal incision, and ties the two halves in two firm ligatures, one end of each of which is left long. The tendon is then freed from the globe. The capsule on either side of the tendon is sewn more or less deeply, according to the effect required. Then a firm basis of fixation on the ball of the eye is given, for which purpose "pulley stitches" are weak and uncertain; a ligature, in which the conjunctiva alone is deeply and firmly held, is preferable. Two of these fixation loops must be

applied, one above and the other below the corneal margin, more or less close to the middle line, according to the desired effect. These stitches are then tied to the long ends of the first pair of stitches through tendon and capsule. Photographs and patients were shown to illustrate the results obtained.

Friday, August 16th.

Blennorrhœa Neonatorum and its Prevention.—Dr. Grossmann pointed out that the efforts of contemporary surgery and medicine have been pre-eminently directed towards prevention rather than cure. It is therefore surprising that so preventible a disease as blennorrhœa neonatorum should be allowed to fill our blind asylums. The cause lies in the fact that the little patients are usually brought too late for treatment, and yet the mischief might be easily prevented, for the cornea in infancy shows a much greater resistance to destruction from purulent discharge than in later years. As for treatment, the discharge can easily be stopped by a great many remedies, whether the presence of gonococci could be demonstrated in the secretion or not. The only rational way of treatment, however, is the *prophylactic* method, introduced by Crédé in 1880, who brought down the percentage of the occurrence of this disease from 13.6 to 0.5, and finally to 0.0. A wholesome reform on a large scale, and thereby the stamping out of the disease, can only be expected by scrupulous cleanliness on the part of the midwives, for which purpose strict regulations were proposed by the speaker.

The President agreed with the views expressed, and hoped Dr. Grossmann would persevere in his efforts towards the stamping out of infantile ophthalmia. He also had met with two or three cases where even the greatest care could not prevent disaster, but these were rare.

Dr. Illingworth very strongly recommended the use of biniodide of mercury (1 to 3,000).

Dr. Swan Burnett quite agreed with the different points in Dr. Grossmann's paper. Quite recently the American Ophthalmological Society had appointed a committee to

investigate and report on the question of preventible blindness. Dr. Howe, of Buffalo, had shown that blindness was increasing in the United States in a greater ratio than the population. The all-important thing is prevention, but this can only be carried out by the midwives and general practitioners. Legislation is urgently required.

Mr. Lindsay Johnson was of opinion that it mattered very little what antiseptic was used, provided the eye be left uncovered and the pus be immediately removed whenever it accumulated. Repeatedly a one per cent. solution of alum had given him very good results. Schœler found that calomel destroys the diplococcus in three minutes (against four to six hours by iodoform).

Mr. Snell thought the question of such importance that it should be brought before the British Medical Association next year, as the Section of Ophthalmology is not a sufficiently representative body.

On Tumours of the Optic Nerve.—Dr. Sym described the case of a girl aged three. The symptoms were merely exophthalmos and blindness, stated to have occurred suddenly during an attack of whooping cough. Proptosis immense, irreducible by pressure, in an upward and outward direction; cornea clear, but ophthalmoscopic examination not possible. Under chloroform, a tumour, felt at the inner angle, was removed, together with the eyeball, which could not be saved. Recovery good. Tumour proved myxosarcoma. Dr. Sym then showed a chart giving an analysis of the sixty-eight previously published cases. Myxoma and sarcoma are the commonest forms. The disease is usually left-sided, and occurs in young patients. The three most important symptoms are: exophthalmos, early and complete amaurosis, and optic neuritis or atrophy. Pain is frequently absent. In five cases of removal, the eyeball was retained, while seven ended fatally from purulent meningitis.

Observations on the Therapeutical Action of the Violet and Ultra-violet Rays of Light on Vision.—Mr. Johnson, having found that in a case of detached retina the constant use of blue glasses increases the visual field, thought that blue glass of such tint as would exclude the red end of the

spectrum completely might be still more useful. After various fruitless searches for such glass, he constructed goggles in the shape of a trough, containing a solution of ammonio-cupric sulphate. The colour, however, faded by the action of light. At last a suitable greenish-blue glass was found, and the results obtained thereby during the last three years were highly satisfactory in cases of detached retina, optic neuritis, and neuro-retinitis. In nearly every case of detached retina, the field of vision was largely increased, as shown by diagrams, although a replacement of the detached retina could only be seen in four out of thirty cases. In every case of neuro-retinitis due to temporary causes, vision returned rapidly after a few days, although in some cases it had been declining or stationary for weeks previously. Usually improvement, if at all obtained, by blue glasses, shows itself after about three days. The glasses must be worn constantly, and exclude all other light.

Mr. Johnson showed numerous diagrams, and exhibited a model of rabbit-hutches glazed with red or blue panes, and constructed for the purpose of keeping rabbits in a light thoroughly filtered through either "spectrum red," or "spectrum blue" glass.

Dr. Macnaughton Jones showed an eyeball torn out by a female inmate of a lunatic asylum. The eyeball looked almost as though it had been enucleated, although the patient had only used her own fingers. The optic nerve was torn off about three-quarters of an inch from the globe.

Mr. Frost exhibited a series of sixty lantern slides representing the ophthalmoscopic appearance of the fundus of the eye.

Mr. Hewetson demonstrated cases of cataract extraction without iridectomy, and cases where syndectomy had been performed for interstitial keratitis.

Dr. Hartley showed a modification of Sichel's knife for cataract operation. He also demonstrated cases of cataract extraction without iridectomy.

AMERICAN OPHTHALMOLOGICAL SOCIETY.
 TWENTY-FIFTH ANNUAL MEETING, HELD AT NEW LONDON,
 CONN., JULY 17TH AND 18TH, 1889.

President : DR. WILLIAM NORRIS, of Philadelphia.

Reported by Dr. EDWARD JACKSON.

(Continued from p. 284).

Danger to Life from Enucleation of the Eye.—Dr. H. D. Noyes (New York): After evisceration, the reaction is more severe and the healing protracted. His experience did not incline him to substitute it for enucleation very frequently. In estimating the danger to life from enucleation we must bear in mind the enormous number of times it has been done. Among 1,164 cases in the New York Ear and Eye Infirmary there had been no death; and 161 of these were cases of acute panophthalmitis. It is to be remembered also that in acute panophthalmitis death has frequently occurred from meningitis, without enucleation. It is most important in cases of cerebral involvement, with or without enucleation, to secure free drainage. In illustration, a case was narrated in which, after enucleation, the symptoms of brain involvement grew worse. The patient was etherized and multiple incisions were made through the intensely infiltrated tissues to the apex of the orbit. The parts were thoroughly irrigated with a sublimate solution, and drainage favoured by position. Rapid recovery ensued.

Dr. Kipp had found pus deep in the orbit the third day after injury to the eye-ball.

The Treatment of Caries and Necrosis of the Orbit.—Dr. H. Knapp (New York): The majority of these cases arise from disease of the cavities in the bones surrounding the orbit. In every case, these should be carefully examined, especially those opening into the nose; and any diseased conditions treated. Free openings must be made to secure the thorough washing out of the involved cavities. He had used perforated silver tubes for drainage, finding them satisfactory. Where cicatricial contraction occurs, the

mere excision of the cicatricial bands is not enough. Plastic operations should be done before the cornea is injured by exposure.

Multiple Cysts of the Iris.—Dr. H. W. Williams (Boston) reported the case of a child, 9 years old, in both whose eyes were cyst-like enlargements, projecting from the margins of the pupils; and so far obstructing the pupillary area that no useful vision existed, nor could the fundus be seen with the ophthalmoscope. No inflammatory conditions were present, and the morbid growths, some of which were pedunculated, resembled in appearance and colour a dilated and thinned iris.

Sarcoma of the Optic Nerve.—Dr. T. Y. Sutphen (Newark) exhibited a photograph, and reported a case, of this character. The eye had been blind two years, and the tumour noticed for eighteen months. It had extended beyond the orbit and was mushroom-shaped, 6 by $5\frac{1}{4}$ inches in diameter. Its removal was followed by normal healing, and no return, in several months.

Extensive Vascular Growth in the Vitreous.—Dr. G. C. Harlan (Philadelphia) reported a case and showed a sketch of the ophthalmoscopic appearances. The vessels all sprang from those of the disc. The patient was a woman of 80. Her history was negative, but subsequently numerous hæmorrhages occurred.

Extraction from the Vitreous by the Magnet of Bits of Steel that had Passed through the Lens.—Dr. O. F. Wadsworth (Boston) reported two cases of this kind, in both of which the lens remained so clear that through it the foreign body was distinctly recognised. In one the lens continued to grow more transparent, and the vision to improve for some days after the operation. Thirteen months later, however, the lens was entirely cataractous, and vision reduced to counting fingers at one foot. The second case, when seen on the sixteenth day, showed a linear cicatrix in the cornea, and a narrow band of opacity through the lens. For some time after the extraction of the fragment, vision was $\frac{1}{12}$. But he complained of flashes of light, vitreous threads were noticed, black specks appeared before the disc and neighbouring parts of the fundus; and

gradually a detachment of the retina with corresponding loss of the field of vision, beginning in the quadrant opposite the wound made for extraction, spread until it became total. Were these black specks that were noticed colonies of bacteria?

Transplantation of the Cornea.—Dr. O. J. Tansley (New York) had practised it after the manner of Hippel. It had not been possible to remove the whole thickness of the opaque tissue, and the graft also became opaque. He had subsequently repeated the operation on the same eye, including in the second trephining a portion of the first graft. It healed with more transparent graft, but again there had been failure to reach clear corneal tissue. Vision not improved.

Dr. L. W. Fox had done the operation twice, in one case vision was somewhat improved.

Ocular Symptoms Observed in So-called General Paresis.—Dr. C. A. Oliver (Philadelphia) reported observations made on twenty males, free from other disease, and in the second stage of general paresis of the insane. He found: That unequal optic nerve degeneration, decrease of retinal circulation, with subnormal direct and eccentric vision for both form and colour distinctly show lowered sensory nerve response. The unequal and feeble movement of the irides, causing inequality and irregularity of the pupillary areas, a peculiar form of ataxic nystagmus, and slight loss of ciliary tone all express want of proper muscle action—true paresis. In the fundus, pigment markings, crescents of absorption, and disturbed and granular conditions of the choroid, indicate wear and tear of an abused and irritated organ. We have therefore, both local changes; and peripheral expressions of a general gradual loss of neural strength and power.

Hysterical Blindness of Ten Years' Duration in the Male.—Dr. G. C. Harlan (Philadelphia) reported two cases. In one, a boy, said to have been blind for eighteen months, was cured by repeated applications of electricity. The second was that of a man who had been struck in the right eye with a stone ten years before. The eye had been blind ever since. There appeared no reason for blindness. The left

was normal. Recently the right eye had been the seat of some pain, and he had been advised to have it enucleated, and he came prepared to submit to the operation. A prism with its base down before the good eye gave normal diplopia. Placing before the patient's right eye its correcting lens, and before the left a plus spherical strong enough to prevent distant vision, he read $\frac{3}{8}$. On covering the left, and calling his attention to what he was doing, "his surprise was only equalled by his joy." The writer doubted if such patients really could see by any voluntary effort. He had formerly spoken of such cases as those of deception or malingering, but he now believed this was a mistake.

Dr. St. John had failed to detect by any of the usual tests a boy that he suspected of malingering; and had referred him to Dr. Carmalt, who was also puzzled at first; but afterwards noticed that he would close the eye he claimed was blind, and in this way find out how to answer each test. He was told that he would speedily recover, and did so.

Hemianopsia with Peculiar Cerebral Symptoms.—Dr. S. B. St. John (Hartford) reported a case in which there was blurring of the nasal half of each visual field, and doubtful atrophy of the nerves. The right eye is now blind, the left with vision greatly diminished. The cerebral symptoms are those of pressure. Anti-syphilitic and anti-malarial treatment had proved equally valueless.

Double Purulent Choroiditis Resulting from Meningitis.—Dr. T. Y. Sutphen (Newark) reported a case occurring in a boy in whom the eyes became inflamed, on the 4th and 10th days respectively, of an attack of cerebro-spinal meningitis. The pupils were dilated, and there was a yellowish reflex from behind the lens. The lens was for a time pushed forward, and the anterior chamber obliterated, but it was speedily restored, and the globe became soft. In all other respects his health was now good.

Dr. Knapp: These cases are metastatic, they are rarely or never due to direct extension of the inflammation along the optic nerves from the brain membranes.

Notes on Simple Tests of the Ocular Muscles.—Dr. B. A. Randall (Philadelphia) referred to the tests, originally given by Græfe, as the most satisfactory yet brought forward. He laid stress upon the essential condition, in all tests of the muscular balance, of having the accommodation fixed by the use of a fine fixation object. He claimed that if the patient be caused to fix upon the point of a pen or similar object, at ten inches, and the card used to cover one eye be rapidly shifted from one eye to the other, a test is furnished that will very rarely fail to show any insufficiency present, however minute. He further urged that this test gave a valuable indication of the degree of deviation, and the estimate based upon it rarely varied as much as two degrees from the result obtained by measurement with prisms. For vertical diplopia tests, near or far, he advocated the "obtuse-angled" or double prism of E. E. Maddox (*Ophth. Rev.*, 1886, p. 341) as extremely convenient, since with it the balance of all the muscles was tested at once, and even minute deviations in any direction promptly recognised, to be then measured in the usual way. He cited some results from a large series of measurements, as indicating great frequency of insufficiency of convergence in hyperopes, rarity of insufficiency of the externi, and the entire absence, in his experience, of latent insufficiency.

Adeno-sarcoma of the Lachrymal Gland.—Dr. S. C. Bull reported a case, occurring in a man aged 35. The swelling had commenced a year before, and gradually increased. It had never been painful, and was perfectly movable between the conjunctiva and globe. It was removed through an incision in the line of the brow. Section showed that it had commenced near the centre of the gland. It consisted mainly of small round cells. Near the periphery were some normal gland tubules. Two years and a quarter had elapsed, and there had been no recurrence.

Abscess of Ethmoidal Cells, Frontal Sinus and Orbit.—Dr. Bull: There was a tumour at the upper inner angle of the orbit, which had lasted five months. There had been diplopia for a month, vision normal. Pus was obtained with the hypodermic syringe. An incision was made in the line of the brow, and the cavity thoroughly washed

out ; a drainage tube was inserted, and irrigation regularly practised with sublimate solutions. The tube was removed in three weeks, and in four months healing was complete.

Myxo-Sarcoma of the Orbit and Neighbouring Cavities.—

Dr. Bull : The tumour was partly cystic. It occurred in a man of 81. The first symptoms were pain about the orbit and an offensive discharge from the nostril. It probably began in the maxillary sinus, filled the orbit and ethmoid cells, and from the latter protruded into the cranium. The contents of the orbit were removed, but no more could be done, and the patient died a few days later. It had run its course in ten months.

Dr. Knapp : Tumours in this region should be attacked as soon as we make the diagnosis.

Abscess of Orbit.—Dr. J. C. Reeve (Toronto) : Of twelve cases of abscess involving the orbit and neighbouring cavities, four seemed due to nasal catarrh, and two to hypertrophy of the middle turbinated bone.

Double Choked-disc due to Intra-cranial Tumour, with Autopsy.—Dr. Bull reported the case of a married woman aged 23, one child. Had miscarriage five months before she was seen, and from that time had headache. Two months later diplopia, which had since passed away. When first seen ocular movements and accommodation normal. Vision $\frac{3}{8}$ partly. Partial central colour-scotoma. The optic discs were enormously swollen, most prominent portion 12 D. Diagnosis of tumour made on these symptoms. A month later vision was failing, and in three months light perception was gone. Later there was loss of smell, right hemi-anæsthesia, and loss of mental power to complete dementia. The swelling of the optic discs increased. The autopsy showed the olfactory bulbs gone, the infundibulum enlarged, the fifth nerves displaced, the ventricles enormously distended, and a glioma of the corpora quadrigemina.

Spastic Torticollis Cured by Tenotomy of the Superior Rectus.—Dr. O. F. Wadsworth (Boston) reported the case of a boy whose eyes had always been "wandering," who constantly carried his head near the right shoulder, which was itself considerably depressed as compared with the left. He had no diplopia, and no diplopia could be produced ; but

it was only in some such position that he could approximate binocular fixation. After the tenotomy he had a considerable field of binocular fixation with the head in the normal position. Subsequently there was some return of the trouble, which was met by the wearing of a prism.

Dr. S. D. Risley had seen three cases of carrying the head to one side to get binocular vision. One of these had been corrected nine years ago by tenotomy, and had returned two years ago with a return of the trouble, requiring a second operation.

Partial Tenotomy for the Relief of Asthenopia.—Dr. Myles Standish (Boston) believed that the value of partial tenotomies of the ocular muscles could only be ascertained from carefully recorded experience. As a contribution in this direction he wished to place on record five cases in which he had done such an operation. Three were cases of esophoria, insufficiency of the externi; two were cases of exophoria, insufficiency of the interni. All were markedly benefited, except one who passed from under treatment before the muscular errors could be fully corrected. The writer believed partial tenotomy would prove of great service in a certain small class of neurasthenic patients. In diagnosis he had found that the power to overcome prisms with their bases toward the nose or temple threw very little light on the case. The Græfe or vertical diplopia test was of much more value. He also relied on the effect of the wearing of prisms as an indication of the probable effect of a tenotomy.

Dr. Harlan had found that the power to overcome prisms was greater, more constant and more significant, when tested with the variable revolving prism (prism mobile) than when tested with the ordinary constant prisms such as are furnished in the trial-set.

Dr. Theobald thought that insufficiency of the externi was a more serious condition than insufficiency of the interni.

Dr. Risley believed it unusual to get any uniform result in a number of tests of the power to overcome prisms. The vertical diplopia tests are more reliable; but they should be made with the proper correcting glasses before the eyes, and for the near test the accommodation must be brought to

the proper tension. He used for the fixation object a word printed in small type. He also found the revolving prisms very valuable. He exhibited a form of such prisms conveniently arranged to fit in the trial frame.

Dr. Jackson, for the vertical diplopia near test, used, instead of a single large dot, a small group of fine dots which the patient was asked to count, and in this way fixed the tension of the accommodation.

Some Vagaries of Accommodation.—Dr. David Coggin (Salem), under this head, reported four cases of spasm of the accommodation, causing hyperopia to simulate myopia and astigmatism.

Relaxation of the Accommodation by Looking into a Mirror during Ophthalmoscopic Examination.—Dr. E. E. Holt (Portland) had in his consultation room a mirror, placed so that the patient could look into it somewhat obliquely, while undergoing the ophthalmoscopic examination. He found it a very appreciable aid in securing relaxation of the accommodation, in this practical extension of the distance of the object on which the patient's gaze was fixed. On looking from the mirror itself to the objects reflected in it, the pupil could be seen to dilate, quite notably.

Prolonged Mydriasis after Homatropine.—Dr. O. F. Wadsworth (Boston) reported a case in which, after the use of homatropine in both eyes, one returned promptly to the normal condition, while the pupil of the other remained considerably dilated for several months, although the power of accommodation was very nearly as great as in the first eye. The pupil finally contracted to the size of its fellow.

Drs. Theobald and Seely had seen similar cases after the use of other mydriatics. Dr. Holt had seen one in which both the pupils remained dilated for four years after the use of a mydriatic. Dr. St. John had seen a case of ten years' standing, said to have followed the use of a mydriatic. Dr. Risley had seen cases due to the contamination of other collyria, by a dropper that had been used for a mydriatic. In this way the pupil might be widely dilated, although the accommodation was not appreciably affected.

Geometrical Constructions to Illustrate Certain Facts of Refraction were presented by Dr. John Green (St. Louis).

The facts to which attention was especially called were those of the increase in the effect of lenses, due to different obliquities of the pencil of incident rays.

Stereoscopic Illusions Provoked by the Use of Unequal Glasses before the Two Eyes.—Dr. Green traced these mainly to the fact that objects of the same size at the same distance, when seen under different relations of accommodation and convergence, appeared to be of different sizes and at different distances. These effects were produced by spherical as well as cylindrical lenses. In his experience, the inconvenience resulting from them was always transient.

The Employment of the Oleate of Veratria to Facilitate the Determination of Errors of Refraction.—Dr. S. Theobald (Baltimore) said that atropia, while suppressing symmetrical spasm of the ciliary muscle, and revealing the total H. or M., has little or no effect upon a symmetrical spasm, and, therefore, does not render manifest the latent astigmatism. In many cases, considerably greater astigmatism becomes manifest after glasses have been worn for a time than can at first be discovered even by the liberal use of a mydriatic. He believed the mydriatics commonly employed increased rather than lessened the capacity of the ciliary muscle for asymmetrical accommodation, by stimulating its radiating fibres, as they do those of the iris. Oleate of veratria (ten per cent.) applied to the forehead, besides lessening the irritability of the eye, seems to have a quieting effect upon the ciliary muscle, acting especially upon the radiating fibres, it would appear, and thus lessening the tendency to asymmetrical accommodation.¹

On this account it was of value in facilitating the determination of errors of refraction. A little should be rubbed on the forehead and temple once a day for three or four days before making the test for glasses. Care must be taken not to get any in the eye, where it causes very persistent irritation. When veratria is thus used instead of a mydriatic, the refraction of the eye should be ascertained as accurately as possible with the ophthalmoscope, and the relative strength of the interni and externi muscles measured at 20 feet and at 13 inches. With data thus obtained, it is practicable, in many cases of complicated errors of refraction,

to decide upon the required glasses as satisfactorily as though the patient had been subjected to the inconvenience of a mydriatic.

Dr. Mittendorf, remembering that veratria was very poisonous and extremely irritating if it reached the eye, believed that the soothing effect could be better gained by the use of cocaine.

Dr. Carmalt was reminded of the earliest days of the Society, when an elderly member opposed the use of glasses for hyperopia, because he cured such cases of asthenopia by veratria ointment applied to the forehead and temple.

Dr. Standish believed that the circular fibres of the ciliary muscle were as mythical as the radiating fibres of the iris. He had thoroughly satisfied himself that they did not exist.

Dr. Theobald would avoid cocaine when refraction was to be measured, on account of the irregular astigmatism it caused by its action on the corneal epithelium.

Inefficiency of Homatropine Hydrobromate.—Dr. E. E. Holt reported one case, as an example of several that had occurred in his practice, in which this drug had proved inefficient in controlling the accommodation of the eye for the purpose of fitting glasses. A strong solution had been instilled every hour for many hours, but the glasses selected under its influence were unsatisfactory, and ten weeks later, under atropia, proved quite incorrect.

Drs. Jackson and Gruening regarded homatropine as a thoroughly reliable mydriatic. They used it by instilling a two or three per cent. solution, every few minutes, about an hour before the refraction was to be tested.

Ametropia Determined with Paralysis of the Accommodation.—Dr. Edward Jackson (Philadelphia) presented some of the results of a study of the refraction of some 4,000 eyes, determined with the aid of mydriatics. The relative frequency of the different forms of ametropia was: compound hyperopic astigmatism, 40 per cent.; hyperopia, 31 per cent.; compound myopic astigmatism, 9 per cent.; mixed astigmatism, $6\frac{1}{2}$ per cent.; simple hyperopic astigmatism, 6 per cent.; myopia, 4 per cent.; simple myopic astigmatism, 2 per cent.; emmetropia, $1\frac{1}{2}$ per cent. The

eyes were those of patients seen in practice. The proportions were, in many respects, the reverse of those obtained without the use of mydriatics. Of eyes in which the antero-posterior axis was too short (hyperopic), 63 per cent. showed astigmatism, while of those in which it was too long (myopic), 76 per cent. showed astigmatism. The figures supported to some extent the idea of a connection between myopia and astigmatism.

Accuracy in Prisms.—Dr. Jackson presented tables designed to aid in securing accuracy, by showing the prismatic effect produced by a varying degree of decentering of lenses. The combination of a prism with a lens has simply the effect of decentering the lens, and inaccuracies in such combinations are often overlooked as inaccuracies of centering. A convenient way of ordering a certain prism is to order the lens decentered a certain number of millimetres. Another table gave the refracting angles required to produce certain degrees of deviation. It illustrated the fact that there is no fixed relation between the refracting angle of a prism and its strength. Thus, with ordinary optical glass, to produce a deviation of 8 degrees requires a refracting angle of $14\frac{2}{3}$ degrees, while the prism of about 80 degrees refracting angle produces 80 degrees of deviation.

A New Unit for the Numbering of Prisms.—Dr. W. S. Dennett (New York) alluded to the necessity that had been shown for a new system of numbering of prisms. For good scientific reasons, it would be well to have the new system of numbering based on the radium, the portion of a circle equal to the radius; and he proposed that it should be the one-hundredth of a radium, to be called a centirad. By making our prisms of flint glass of a certain index of refraction, a prism having one degree refracting angle would have one centirad of refractive power; and thus the old and new systems of numbering would be harmonised.

Periscopic Cylindrical Lenses.—Dr. Harlan again called attention to the curved cylinder lenses, a sample of which he had exhibited to the Society four years ago. Their principal advantage seemed to be, that with them periscopic cylindrical lenses could be obtained, and where the lenses had to be strong, this was a decided advantage.

Toxic Amblyopia Produced by Chloral.—Dr. W. F. Mittendorf (New York) reported the case of a man aged 35, who used no alcohol or tobacco, but who had for six months been taking from 40 to 60 grains of chloral hydrate daily. His visual acuteness was greatly impaired; he had a small central scotoma for red and green, and his optic discs presented the peculiar "muddy" appearance often seen in tobacco amblyopia. The use of chloral was stopped, regular exercise taken, and strychnia administered. Improvement commenced in four days, and in three weeks, vision had risen to $\frac{1}{8}$, and the scotoma was gone.

RECENT LITERATURE.

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Berlin, 1889. A. Hirschwald.

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Kl. Mon.-Bl., Sept., 1889, p. 337.

B. UVEAL TRACT. VITREOUS AND AQUEOUS. LENS.

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Wien. Klin. Woch. 31, p. 613.

D. ACCOMMODATION. REFRACTION. MOTOR APPARATUS.

GALLENGA. Della misura del tempo nella determinazione dell'accommodamento relativo.

Parma, 1889.

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E. EYELIDS. LACRIMAL APPARATUS. ORBIT.

BERLIN. Die einfache Entropium-Operation.

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SCHREIBER. Eine Entropium-Operation.

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THE COMPOSITION OF THE HUMAN LENS
IN HEALTH AND IN CATARACT, AND
ITS BEARING UPON OPERATIONS FOR
THE LATTER.*

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In April, 1887, my attention was directed to the subject of the composition of the cataractous lens as compared with the healthy lens, in consequence of the question then being re-discussed as to the propriety of extraction of immature cataracts.

I was disappointed to find, on referring to the classical authorities upon the subject, how meagre was the material from which conclusions had been arrived at, and how impossible it was to equate the analyses of various observers, made at different times, in different ways, often of lenses from different animals, and with very diverse degrees of caution in eliminating the numerous sources of error, and in consequence how valueless and often contradictory were the data which presumed to guide our practice in this field of ophthalmology.

I therefore determined to set to work to analyse a series of healthy and cataractous lenses of different ages, all from the human subject. It is needless to say it was no easy task to obtain the material required sufficiently fresh and sufficiently intact to secure a reliable basis of comparison. Opportunities of this kind do not present themselves every day; my re-

* Read before the British Medical Association at Leeds, August, 1889.

searches have thus perforce been extended over a couple of years. In so far as their number is small, the results must be held to be contributory and suggestive rather than conclusive and final. I have, however, secured complete uniformity in the analyses by conducting every one of them myself, in my own laboratory, with the same apparatus and the same chemical balance in each and every case; moreover, I started and continued the observations without any preconceived ideas upon the subject, and the scattered data, which have been in no way selected, have been collected, arranged, and tabulated only within the last few weeks, so that I can claim that if the facts permit of any generalisation, such is the result of no *à priori* bias, but the legitimate outcome of a laborious *à posteriori* induction.

In the first place, I have dealt exclusively with human lenses; moreover, I at once discarded post-mortem material, having regard to the speedy decomposition of ocular tissues and the varying length of time which must of necessity elapse between death and the required analysis.

Cataractous lenses, the result of extraction, are of course relatively plentiful in a large clinique, but discrimination is required as to those which are available for the purpose in hand.

Those extracted in the capsule are naturally the most likely to be in perfect integrity, and when such were to be had I employed them, first removing the capsule; but these are few and far between, and consequently resort was had to cases where the cataract was ripe or very nearly so, and when the lens was delivered entire, without leaving soft cortical matter behind.*

* There may be a possible source of error here, inasmuch as what *appears* to be a complete extraction of a cataract may leave minute portions of the cortex, and thus lessen the total weight. I do not think, however, that such error can be large, and it is to the relative rather than the absolute weights I refer, and still more to the ratio of water and solids.

I have analysed ten such in all, chiefly from my own operations at the North-West London and Temperance Hospitals, and one or two private cases.

Clear human lenses from fresh eyes are much more difficult to procure ; I have secured six in all—five from cases of injury in which the eye was irretrievably damaged but without implication of the lens, and one from a case of intra-ocular tumour in which the whole anterior half of the eye was free from disease.

In some previous researches, notably those of Deutschmann, the lenses were conveyed long distances in the interval between extraction and analysis, as, for instance, from Wiesbaden and Breslau to Göttingen, and no mention is made of the mode of their preservation and protection during transportation.

In my observations the lens was, in every case, either placed in a corked, dry, glass test-tube, or sealed up in gutta-percha tissue, and was in most cases on the water-bath in my laboratory within an hour of its removal from the eye.

The data which I ascertained in each case were—

1. The weight of the lens.
2. The amount of total solids.
3. The amount of water.
4. The amount of ash.

As my object was to obtain these in relationship with age, I was unable to proceed further, *e.g.*, in the estimation of globuline, lecithin, fat, cholesterine, and soluble and insoluble salts, as the amount of material in a single lens for such purposes is inadequate for reliable result.

The mode of procedure I adopted was as follows:—The lens, minus its capsule, was placed in a cleaned, dried, previously weighed platinum dish ; it was reduced to fine fragments by a couple of needles, care being taken to remove no lens matter with them ; the whole was then again weighed. The object of the trituration was to increase facility for the escape of water.

The platinum dish was at once transferred to the water-bath, kept at 100° C. ; after forty-five minutes it was again weighed, and this was repeated at intervals of ten or fifteen minutes until a constant weight was secured. The weight of the dish being deducted, the amount of total solids was obtained ; this, taken from the weight of the whole lens, of course gave the amount of the water. The residue was then incinerated in the Bunsen flame until no blackness remained, and after cooling was again weighed. The bulk of this saline residue was NaCl.

Having explained the method, I proceed to my results. These are given in the accompanying table. The first column shows the ages, the second the weights of the lenses, the third the amount of contained water, the fourth the total solids, the fifth the ash ; the sixth, seventh, and eighth give the percentage of the water, solids, and ash to the total weight. The six clear lenses come first, and below them the cataracts. The figures in thicker type are the averages. The average age of the clear lenses is 32.5 (the extremes 10 and 64), of the cataracts 61 (the extremes 46 and 87). This has been unavoidable, having regard to the source of the material, but I am not aware that on consideration of the tables, along with such other knowledge as we possess, it will materially invalidate the result, or at any rate that the data we have will not afford sufficient suggestion as to the data we have not to permit of just allowance being made for the latter, and fallacies thus avoided.

Directing our attention in the first place to the healthy lenses, as regards weight there appears to be a regular increase with age, with one single exception, however, the lens aged twenty-six, from .163 gramme at ten to .247 gramme at sixty-four.

I need not dwell at any length on this subject, which has been so fully elaborated by at least one careful and able observer.

TABLE OF COMPARATIVE ANALYSES OF SIX CLEAR HUMAN
LENSES AND TEN HUMAN CATARACTOUS LENSES.

	AGE.	Total Weight.	Total Water.	Total Solids.	Ash.	PER CENT.		
						Water.	Solids.	Ash.
CLEAR.	10	'163	'113	'050	'001	69	31	'6
	26	'215	'153	'062	'002	71	29	'9
	27	'88	'136	'052	'001	72	28	'5
	28	'1915	'132	'0595	'002	69	31	1'0
	40	'2175	'1575	'060	'001	73	27	'4
	64	'247	'176	'071	'001	71	29	'4
		'204	'1446	'059	'0013	71	29	'8
CATARACTS.	46	'13625	'10150	'03475	'00175	74'5	25'5	1'3
	47	'116	'081	'035	'002	70	30	1'7
	53	'1351	'0926	'0425	'001	68'5	31'5	'7
	59	'0850	'042	'041	'002	52	48	5'0
	60	'128	'095	'033	'0015	74	26	1'2
	61	'100	'070	'030	'001	67	33	1'0
	63	'110	'0725	'0375	'002	66	34	1'8
	64	'101	'0575	'0435	'001	74	26	1'2
	77	'110	'071	'039	'001	64'5	35'5	'9
	87	'110	'0445	'065	'001	40'5	59'5	'9
		'113	'073	'040	'0014	65	35	1'57

Priestley Smith's valuable paper on the growth of the lens, in vol. iii. of the Ophthalmological Society's Transactions, was based upon observations made upon 156 lenses removed after death, as to weight, volume, and equatorial diameter, while the specific gravity he calculated from the weight and volume.

He found the weight of the lens between twenty and twenty-nine to average 174 milligrammes ; between sixty and sixty-nine, 240 milligrammes. The average volume he found to increase in nearly the same proportion as the weight, from 163 cub. mm. to 225 cub. mm., or an annual increase of about 1·5 cub. mm.

My few results, obtained from perfectly fresh lenses, are in almost complete accord with Priestley Smith's figures, derived from post-mortem specimens.

The average weight of the six clear lenses I examined was about two decigrammes.

As to the amount of water, I find that this remains in the clear lenses remarkably constant, about 70 per cent. Its absolute amount increases nearly in the same ratio as the whole lens ; it is much the same in the child of ten, the young adult, and the man of sixty. Kuhne, whom most of the books copy, gives 60 per cent. of water in the healthy lens, Laptschinsky from four analyses of the lens of oxen made it 63·51, Schneyder found it 63·267 in a boy aged five months ; Wecker and Landolt say 60. Jacobsen comes nearer to my figure ; he gives 70·8.

The amount of the total solids, it follows from what I have said, also remains tolerably constant throughout life, viz., about 30 per cent., the extremes being 27·12 and 31·07, a range of variation of only 4 per cent.

This result differs from Deutschmann, who found the total solids increase with age, not only absolutely but relatively to the water, from 29·2 per cent. to 35·4 per cent., an increase of 6 per cent., which after all is inconsiderable, and his observations were vitiated, as I said before, by the transport of the lenses.

This absence of the diminution of the amount of water and the increase of solids in the lens with age may appear to be contrary to *à priori* reasonings based on general impressions, and from the cuticular homologies of the lens.

Becker, in Graefe and Saemisch's handbook, says that "the young lens fibres are thicker, softer, richer in water, freer from colour ; the older they grow the more they give up their water and become flat, closely compacted, and amber coloured." Again, he says in his monograph that Deutschmann found what had previously been believed, *i.e.*, that the solids increased with age ; apparently these are the grounds for the statements, and they, for the reasons which Becker himself points out, are not of an unassailable character.

Donders, again, hints at an increase of density of the lens with age in dealing with acquired hypermetropia.

On the other hand, my conclusion is strikingly corroborated by the calculated specific gravities of lenses of different ages which Priestley Smith thus tabulates :—

Age.			Spec. Grav.
20-29	...	...	1,067
30-39	...	...	1,085
40-49	...	...	1,085
50-59	...	...	1,078
60-69	...	...	1,067

and he draws the conclusion that the specific gravity of the lens is, on the average, nearly the same at different periods of adult life ; that the increase of its weight is due not to an increase of density, but to an augmentation of size.

Indeed, upon reflection, the sclerosis of the lens fibres, which has been alleged, in so far as that term suggests dehydration, is in no sense corollary to its derivation from cuticular epiblast or its homologous relationship with the epidermis. Because the latter exposed to air and pressure tends to cornification and dehydration from its surface is, I submit, no reason why

the lens excluded from air, nay, bathed with fluid, should exhibit a similar change at its nucleus, which is required to make this fallacious analogy complete. The growth and nutrition of the lens are without parallel in any other tissue of the body.

The ash of the healthy lens is very constant, and weighs about 1 milligramme, less than 1 per cent. of the whole lens, and shows no variation correspondent with age.

Turning now to the series of recent cataractous lenses, ten in number, removed from persons aged from forty-six to eighty-seven (averaging sixty-one), I find as regards the absolute weight that in not one single instance did this reach, nay, did not approach, the weight of the lightest of the clear lenses. Their average weight was '113 gramme, against '204 in the former series. Moreover, the heaviest was the youngest of the series, and the tendency was rather to diminish with age, the reverse of what obtained in the clear lenses. This result is the more striking when we remember that all the evidence at hand goes to show that the healthy lens continually increases in weight with advancing years, and in all probability the contrast would have been still more striking if the series of healthy lenses were extended to later ages.

Here, again, my results yield unsolicited corroboration of Priestley Smith's observations. He says, "The lenses in which cataract was beginning were, as a rule, smaller than transparent lenses of the same age."

In the tables which he appends to his paper I can find only two weights of completely cataractous lenses. One of these, aged sixty-nine, weighed '184 gramme; the other, aged seventy-six, weighed '175 gramme; figures both much below the average weight of healthy lenses of those ages as given in his tables.

Now as to the composition of cataract in respect of water and solids. I find both to be absolutely less than in healthy lenses, but not in the same degree. The

average amount of water in the clear lenses weighed '1446 gramme, that in the cataract '073 gramme ; the average amount of total solids was in the clear '059, in the cataracts '040. The highest figure for the water in any cataract was '1015, there being no regular variation with age ; on the other hand, the lowest figure for the water in the clear lenses was '113.

The highest for solids in the cataracts was '065, in the oldest of the series, eighty-seven, which was the only one which exceeded the lowest figure for the solids among the clear lenses, the next class highest being '0435, the lowest of the clear being '050. As to the relative proportions of water and solids in the cataracts, this showed a much greater range of variation than in the case of the clear lenses. In the latter case the average proportions were 71 water to 29 solids, while in the cataracts the average proportions are 65 water to 35 solids, an excess of 6 per cent. of solids ; whereas the range is at least 30 per cent., viz., in the case of the solids from 25·5 in the youngest to 59·5 in the oldest.

As with the clear lenses, so with the cataracts, it would appear that individual peculiarities rather than any age changes determine the ratio of water and solids ; a lens, whether clear or opaque, does not necessarily become denser as it becomes old, while it is nevertheless true that the law of continuous lens growth which obtains in health does not hold, indeed shows a tendency to inversion, when the cataractous change appears.

The ash of cataracts is absolutely nearly the same as in clear lenses ; this, taken in connection with their lighter weight, shows on an average a relative excess of ash amounting to about 50 per cent.

Otto Becker, from an analysis of four senile cataracts extracted within their capsules, and one incipient cataract, found 76·23 per cent. to 69·06 per cent. of water ; in the incipient cataract the solids were the least.

Jacobsen, from analyses of cataract not intra-capsularly

extracted, found the water to be 63·45 per cent. to 73·6 per cent.

Becker seems to incline to the opinion that in ripe or ripening, but not shrunken cataracts the water is increased in amount.

In order to eliminate errors based upon the smallness of the material employed, I secured four cataracts, all nearly intact and quite fresh, from persons aged sixty, sixty-seven, seventy-three, and seventy-seven, and estimated the water, solids, and ash in the combined lens matter.

The results were 62·14 per cent. of water, 37·86 of solids, and ·83 per cent. of ash.

None of these were what could be termed *cataracta reducta*; and the conclusion to which I am irresistibly led from this and every other observation is that, while allowing individual exceptions, cataractous lenses as a general rule contain relatively less water and more solids and ash than non-cataractous lenses, and that this dehydration, associated with opacification, is in no sense a change dependent upon age, and has no parallel in the ordinary changes which age brings with it in the clear lens.

Such slight upward tendency of the ratio of solids to water in older cataracts as may be detected in my figures would appear to be referable, then, rather to the age of the cataract than to that of the lens.

The cataractous process is not an exaggerated senile change, but due to disturbed nutrition of quite another nature, in so far as chemical and not morphological changes are concerned.

Turning now to the question of the practical bearing of these conclusions upon operations for cataract, I would remark that if the argument be advanced that early extraction should be adopted in cases of immature cataract in persons past middle life, because the cataract in such cases is likely to be hard (*i.e.*, rich in solids), on account of age apart from the cataractous change, then

my analyses afford no ground for any such generalisation. A wide diversity obtains in the solidity of cataractous lenses, a range of 20 or 30 per cent., a diversity which has no correspondence in the case of non-cataractous lenses; the cataractous change is not one exclusively of loss of water; the cataractous lens is a light one—a small lens—one in which the normal continuous evolution has been checked and inverted; there is absolutely less water, less solid, but not less ash than in health, but the ratio of the solid to the water, while generally increased, exhibits wide variability in individual cases.

In deciding the question of operation on immature cataracts, then, I submit we must be guided by the circumstances of the individual case, especially the general and local conditions of nutrition, particularly diathetic and vascular conditions.

A cataract is not likely to be more solid because the lens in which the change has occurred is an old one, and any treatment based on such supposition is fallacious and unsound.

E. E. MADDUX (Crieff). *The Clinical Use of Prisms, and the De-centering of Lenses.* (Bristol: John Wright & Co. London: Hamilton, Adams & Co.)

In this attractive little volume the author describes certain methods and aids to precision in the use of prisms which he has worked out during the last few years, and which are likely to prove of practical value in ophthalmic practice. He urges that, in prescribing prismatic spectacles and combinations, methods more precise than those usually employed are desirable.

The subject-matter is divided into five parts. Part I. deals, in the first place, with the geometrical character and optical properties of prisms, and these are well illustrated by simple diagrams. The clinical use of prisms is next ex-

plained. When a prism is interposed between the eye and an object, the object is apparently displaced towards the edge of the prism, and, if the eye continue to fix the object, its visual axis is displaced in this same direction. Hence, prisms set with their edges towards the median line of the face are called adducting prisms; those with their edges outwards, abducting prisms. When, in spite of the presence of a prism, single binocular vision is maintained, an adducting prism makes objects appear nearer than they actually are, because it demands an increased convergence of the eyes, and, conversely, an abducting prism makes them appear too far away.

When a prism is placed before an eye, one of three things may happen: (1) If the fellow eye be excluded a single false image is seen, the displacement of which is unvarying, and depends on the deviating angle of the prism. (2) If the fellow eye be not excluded, and the prism be too strong to be overcome, there is diplopia, the distance between the true and false image being inconstant, and varying with the effort which is made to overcome the diplopia. (3) Or, if the prism is weaker, the diplopia may be overcome, and the object appear single, its position in space being then misjudged by an angle practically equal to half the deviating angle of the prism.

An essential of accurate clinical work is that the prisms employed shall be accurately marked with regard to the position of the "base-apex line," and, in this respect, according to our author, defects are very frequent. Every surgeon should test the marks upon his own prisms. He may do this by drawing a straight line upon a piece of paper and viewing it through the prism, the prism being held some inches distant from his eye, and placed so that the marks which indicate the base-apex line coincide with the line on the paper. If the prism is correctly marked the line appears unbroken by the prism; if not, the part of the line which is seen through the prism appears disconnected from the rest—it is displaced towards the position of the real apex. For the use of opticians, the author suggests an apparatus which carries a diamond for the marking of the base-apex line when its position has been correctly ascertained.

The refracting angle of a prism—the angle which separates its two refracting surfaces—may be measured in several ways, but with this matter the surgeon need not concern himself; he needs to know, not the refracting angle, but the deviating power of the prism, and the latter bears no constant relation to the former, but varies with the kind of glass employed. What the surgeon requires is a ready means of measuring the deviating power of a prism. Standing at a measured distance—say two or four metres—from one wall of his consulting room, he looks at a strip of cardboard which is marked in degrees, and placed upon the wall on a level with his eye; holding the prism with its base-apex line perfectly horizontal, and placing it thus before his eye, so as to cause an apparent displacement of the lower half of the card, he notes the amount of this displacement in the degrees upon the card. The size of the degrees to be marked upon the card depends, of course, upon the distance at which the observer elects to stand. To facilitate the preparation of such a card, a table is given showing the size of the degrees for distances of six feet and two metres respectively. It is clearly an advantage when a patient presents a pair of prismatic spectacles for the surgeon to be able to ascertain their strength without calculation or artificial light. Another simple method which, however, involves the use of a gas flame, is described. Dr. Edward Jackson recently made the important proposal that all prisms for clinical use should be designated in future, not by their angles of refraction, but by the angles of deviation which they produce. To denote this method the letter *d* should be used; thus, prism $2^{\circ} d$ will indicate a prism which produces a minimum deviation of two degrees. The proposal was confirmed by a committee of the American Ophthalmological Society in September, 1888, and conveyed by Dr. Landolt to the Heidelberg Congress, which met in the same year.

Since plane faces are rarely ground as accurately as spherical ones, it is better, when prescribing combinations of lenses and prisms, to let both surfaces be spherical, instead of one spherical and the other plane; in the case of very strong lenses, however, it may be better to make them plano-convex, in order to diminish spherical aberration.

It is important to ascertain that the setting of a prism in the frame is correct with regard to the position of the base-apex line, and this is easily done. Supposing the base-apex line is required to be horizontal, the frame is held a few inches from the eyes, and with its extremities exactly coinciding with a horizontal line upon the wall ; if this line then appear continuous, the prism is correctly set, but if the part seen through the prism appears disconnected from the rest, the apex of the prism is too high or too low according as the apparent displacement is upwards or downwards. If the base-apex line is required to be vertical, the frame is held as before, and adjusted to the horizontal line, and a vertical line crossing the other at right angles is viewed through the prism ; any fault in the setting of the prism is indicated by an interruption in the vertical line, in the same way as before.

In order, when practicable, to let the patient make a temporary trial of prismatic glasses before he obtains them from the optician, the author employs a light wire frame into which prisms of a rectangular shape are readily placed ; such prisms, having a small vertical diameter, are comparatively light, and can be worn together with an ordinary pair of spectacles. The same temporary method of employing prisms is recommended in cases of paralytic strabismus, in which it is desirable to alter the strength of the prisms from time to time.

Part II. deals with decentration of lenses, and combinations of prisms with lenses. The geometrical centre of a lens is a point equidistant from its opposite edges ; the optical centre is a point lying in the principal axis of the lens, *i.e.*, the line which joins the two centres of curvature—it lies in the thickest part of a convex lens, and the thinnest part of a concave one. By decentering a lens, *i.e.*, by displacing it so that its optical centre does not correspond with the visual axis of the eye, the same effect is produced as by combining a normally centred lens with a prism. The effect is equivalent to splitting the lens into two halves and inserting a prism between them. The strength of this virtually interpolated prism varies with the amount of decentration and with the dioptric strength of the lens ;

to produce the same prismatic effect a strong lens needs less decentration than a weak one. The author gives a table showing the prismatic effects produced by various amounts of decentration from 1 mm. to 32 mm., of various lenses from .5D to 20D, so that when it is desired to combine a given prismatic effect with a given spectacle lens, the decentration necessary can be at once ascertained. Such decentration can be effected in one or both of two ways: (1) By displacing the lens together with its rim, *i.e.*, by widening or narrowing the spectacle frame. (2) By displacing it independently of the frame, so that its geometrical and optical centres no longer coincide. Practically, the best plan is to displace the frame so far as it can be done without inconveniently limiting the field of binocular fixation, and obtaining any additional prismatic effect which may be required by decentering the lens in relation to its rim.

The so-called orthoscopic spectacles have the prismatic effect here in question. Their effect is equal in regard to accommodation and convergence, the two lenses having one optical centre common to both, just as though they were cut from opposite edges of one large lens. The proof of their correct manufacture is that they throw a *single* distinct image of a flame upon the wall. They have generally been prescribed in a few standard strengths, and are applicable in certain cases; but it is not desirable to adhere to these fixed combinations of lenses and prisms, but rather to ascertain the conditions of convergence in each case, and to prescribe accordingly.

Part III. deals with the localisation of the eyes, *i.e.*, the precise determination of the distance of the centre of each eye from the middle line. For this purpose a purely objective test, not requiring accurate observation on the patient's part, is desirable. The author places in the trial spectacle frame, before each eye in succession, a half-disc of metal, from which protrudes a short narrow strip in a direction perpendicular to the plane of the face. When the patient's eye and the observer's eye mutually regard each other in a line exactly corresponding with the direction of this strip, the patient's visual axis must be perpendicular to the plane of his face, and the distance between the centre of his pupil and the median

line of his face is indicated upon the frame. The careful use of this instrument shows that many unsuspected differences in the positions of the two eyes are to be found, and, by taking such differences into account, a better adjustment of the spectacles to the individual case is possible.

Part IV. describes methods by which the spectacles already in possession of a patient may be analysed as to their focal length and, which is more difficult, as to the positions of their optical centres. When direct sunlight is available the spectacles may be held at their focal distance from a card placed parallel to the lenses ; the distance between the two points of light on the card then indicates the distance between the optical centres. In the same way artificial light at a shorter distance may be employed, but then some calculation is required. To obviate these difficulties the author has devised an apparatus by means of which, and without the aid of a point of light, the distances of the optical centres from the middle of the frame can be readily ascertained. For the use of opticians who have to deal with large numbers of spectacles, he has devised a second analyser, which permits both the focal length and the position of the optical centres to be tested at the same time.

Here the author points out that the prismatic equivalent of decentering a lens, and the effect of that decentered lens on convergence are two distinct things. In the case of convex lenses, when the object of fixation is at their focal length, the prismatic equivalent and the effect on convergence are equal ; within that distance the effect on convergence is less, and beyond it, more, than the prismatic equivalent. In the case of concave lenses it is always less.

In Part V., the author discusses the various clinical applications of prisms. He distinguishes the following twelve :—

In the consulting-room prisms are used

1. To measure the absolute minimum of convergence, or, what is usually the same thing, the maximum of divergence possible to the eyes. This is indicated by the strongest pair of prisms, with edges placed outwards, which is compatible with single vision of a distant object.

2. To measure the absolute maximum of convergence,

as indicated by the strongest prisms with edges placed inwards, compatible with single vision of an object placed at the shortest distance for which the eyes can accommodate; for this purpose, however, other methods are preferable.

3. To measure the relative range of convergence, *i.e.*, the power of overcoming abducting and adducting prisms respectively, while retaining single distinct vision of an object at a given distance.

4. To dissociate convergence from accommodation. A prism being placed with its edge upwards or downwards before one eye creates a vertical diplopia which cannot be overcome; the eyes then take that position relatively to each other which depends upon the central association of convergence with accommodation, and the lateral displacement of the images reveals the extent to which an unnatural effort was previously required in order to maintain single vision. The use of a double prism for this purpose, and also of a graduated card to indicate the amount of the displacement in degrees, is advocated by the author.

5. To disclose any tendency to vertical diplopia. A prism slightly too strong to be overcome by voluntary effort is placed with its edge outwards before one eye, while the patient looks at a flame six metres distant. Fusion being impossible, any tendency to vertical deviation will be revealed by an upward or downward displacement of one image. A better way, however, to test this point is to use an ordinary stereoscope, placing before one eye a vertical line marked in degrees, upwards and downwards from a central zero point, and before the other a horizontal line exactly level with the zero point; if the horizontal line is seen crossing the vertical line at zero, there is no tendency to vertical diplopia; if it crosses it above or below, the deviation is measured in degrees by the displacement of the horizontal line.

6. To measure the amount by which a given deviation must be diminished in order to place its complete suppression within the control of the patient. This is indicated by the weakest prism, which, placed with its apex in the same direction as the deviation, enables the patient to obtain single vision.

7. To decide the presence or absence of binocular vision. The patient's regard being fixed on a distant object, a strong prism is placed with its edge inwards or outwards before the seeing eye. If, thereupon, the other eye remains motionless, vision is almost certainly binocular, for nothing but its own power of fixation could prevent it from accompanying the movement of its fellow. The same prism is then similarly placed before the doubtful eye ; if, thereupon, the seeing eye make an associated movement there is certainly binocular vision, and the impugned eye has the better vision of the two for the particular distance in question. Again, a weak prism is similarly placed before the doubtful eye ; if this eye make any corrected movement when the prism is quickly withdrawn it is certainly a seeing eye. Sometimes the malingerer may be convicted out of his own mouth ; he will deny that he sees double when a prism is placed before the professedly blind eye, but admit it when it is placed before the fellow eye.

In addition to their use in clinical investigation, prisms may be employed in treatment in the following ways :—

8. To relieve strain between convergence and accommodation when these two functions are not properly balanced ; in other words, to neutralise insufficiency of the internal recti, the prism required being usually equivalent to about half the angle of deviation, which occurs when the images are dissociated by a vertical prism. "There is little to be gained from prisms stronger than 2° of deviating power."

9. To relieve a tendency to vertical diplopia. Since such tendency is usually small, it is seldom necessary to distribute the correction between two prisms. Where tendencies to vertical and horizontal diplopia are combined, these must be estimated separately, but the correction must be made by a single prism obliquely placed. A mathematical formula is given for the such resultant prisms, which will no doubt be useful to those who are able to employ it.

10. To correct persistent and incurable diplopia when of sufficiently small degree.

11. To train the neuro-motor fusion apparatus to gradually overcome a curable diplopia.

12. To diminish convergence for near work in some cases of short sight.

In an appendix the author discusses the work of Dr. Stevens, of New York, which covers to a certain extent the same ground as his own, but which stands alone in having introduced a new nomenclature for deviations of the eye latent and actual, viz., Orthophoria, Heterophoria, Exophoria, Eyophoria, Hyperphoria, and their combinations.

Dr. Maddox's book is well illustrated, and, with the exception of a few somewhat obscure passages, clearly written. We think there are few ophthalmic surgeons who will not learn something by its perusal.

P. S.

DÜBB (Hannover). } Five cases of Congeni-
SCHLEGTENDA (Lennep). } tal Hydrophthalmos.

v. Graefe's Archiv. XXXV. 2, p. 88.

It is impossible to give more than a brief summary of this lengthy paper, but a perusal of the original article and a careful reference to the plates will repay those to whom the subject may be of interest.

CASE I.—Annette, E., æt. 18, was first seen in April, 1885. Her parents, who were cousins, were healthy, and had normal vision; but two brothers—one 20 and the other 8 years old—suffered from congenital hydrophthalmos; the patient herself who was in fairly good general health, had seen badly from early childhood. Condition of the eyes on admission was shortly as follows:—

Right.—Cornea greatly arched, anterior chamber deep, pupil immovable, the sclerotic bulging, and the tension increased to that of stony hardness; the lens was cataractous, and all perception of light lost.

Left.—Here the disease was less advanced, and the media were clear. Vision (with correction for myopia—8D) = Sn 1/12, and J₃, with letters of J₁; the field was much contracted. Ophthalmoscopic examination showed deep cupping

of the disc—a nearly normal macular region, but extensive choroidal atrophy, with in some places almost complete absence of pigment. Iridectomy was performed on the left eye on June 13, with the result that V. improved to Sn 1/9 and J1, while the field enlarged, but the inflammatory symptoms were not wholly relieved till the right globe, which had become very painful, was enucleated. Since then—a period of three years—the left has remained well and T. practically normal; it is to be added, however, that the eye becomes easily tired, and power of accommodation is in complete abeyance. After excision, the right globe was found to be egg-shaped, the measurements being: antero-posterior 32 mm., horizontal 27.5 mm., and vertical 26.5 mm. Microscopic examination:—The cornea in its central part is slightly thinner than usual, but otherwise shows no abnormality; peripherally, round cell infiltration is seen, and at the corneo-scleral junction there is a large increase of blood-vessels, some of these penetrating for a considerable distance into the substance of the cornea; a thin layer formed chiefly of spindle cells invests many of these new vessels. Sections were cut in series with a view to determine the exact condition of Schlemm's canal; for the most part all trace of it is lost, but a few sections showed it as a very thin double line with greatly diminished calibre; the spaces of Fontana are of good size, and the angle of the anterior chamber patent. Iris and ciliary muscle are both atrophied, the circular fibres of the latter especially deficient; the lens remains unchanged, but the zonula is unduly stretched. Marked thinning of choroid and retina has occurred; the layers of the latter—especially the rods and cones—can, however, be easily defined; the optic nerve has undergone a great deal of excavation. The nerve fibres are drawn somewhat apart from each other, and the dural sheath presents a loose, sponge-like appearance, as if from separation into several layers which have assumed an irregular, wavy character.

CASE II.—This eye had been excised some years before it came under observation; nothing is known of the clinical history. Abnormal development of blood-vessels at the margins of cornea and sclerotic is noted, but not to the same

extent as in Case I. The muscular tissue of the iris is fairly well preserved, while the uveal pigment has undergone marked atrophy—microscopic examination shows that in some places the angle formed by cornea and iris is left open, while in other parts it is completely occluded; the circular fibres of the ciliary muscle are hardly recognisable; the lens shrunken, and at the centre calcareous; Schlemm's canal in some sections appears of normal size, in others is obliterated by masses of round, spindle, or pigment cells. The spaces of Fontana are smaller than is normal, the processes rather thick and covered with brownish-yellow pigment. Choroid and retina are both extremely thin; in the latter hardly any trace of the nuclear layers, and none whatever of the rods and cones persists; the optic nerve shows total atrophy and very deep excavation; the condition of the *venæ vorticosæ* was particularly observed, but found practically normal, it being specially noticed that no change in the calibre of the channels had taken place.

CASE III.—Karl D., æt. 12; in early childhood his sight was good, but became gradually impaired as he grew older. When first seen the tension of each globe was very high. V.R.=perception of light only; L.=absolute blindness. As the left eye was subject to frequent inflammatory attacks, it was removed. Microscopic examination gives briefly the following results:—The cornea shows a rich network of new vessels and considerable infiltration, chiefly sub-epithelial in character. Descemet's membrane remains intact: the anterior ciliary veins are very narrow, and the canal of Schlemm has entirely disappeared. Spaces of Fontana persist, but are slightly contracted; iris atrophied and without any remaining trace of muscular structure; choroid and retina very thin, and their vessels small, but in neither is there evidence of old or recent inflammation. Detachment of retina has occurred in several places, while the choroid also is in parts separated from the sclerotic; the retinal layers are well defined, rods and cones being especially clear. Two *venæ vorticosæ* were examined under the microscope; the first showed no endothelial change or narrowing of the channel, but externally both the main

trunk and branches were accompanied by a dark brown pigmentation, which extended also in thin flakes amongst the fibres of the sclera. Similar pigment changes were present in connection with the second vein, but here there was also contraction of the calibre, and in some places division of it into two or three smaller channels, by an apparently fibrous infiltration which is covered with endothelium. Beyond deep excavation of the nerve and a condition of the sheath resembling that described in Case I., there is little to note as to the posterior part of the globe.

CASE IV.—Richard H., æt. 19. In early life vision in the left eye was good; iridectomy was performed in the right when the patient was only four weeks old. The eyes gradually enlarged till, when 12 years of age, he was struck with a snowball on the right globe, which in consequence began to atrophy. When first seen this eye was soft, and vision entirely lost; the left presented a typical example of hydrophthalmos; the cornea is much arched, and measures in the horizontal meridian 16·5, in the vertical 15·5 mm. At the margin only there is slight opacity; the sclerotic is bulging, of bluish colour, and sparsely supplied with vessels; the pupil wide, barely reacting to light. A few lenticular opacities are present, T. greatly raised, and V. reduced to perception of light. The patient died shortly afterwards from tuberculosis, and both eyes were removed. Previous to enucleation, however, the orbital muscles were examined *in situ*, and it was observed that traction on the superior oblique caused a broad and deep indentation of the sclera, in a direction corresponding with the line of action of the muscle. The globe was egg-shaped, like a very highly myopic eye; the measurements were—antero-posterior 35 mm., horizontal 27 mm., and vertical 26 mm. Measurements of the distance between the corneal margin and the insertion of the recti muscles were also taken, and found in each instance to exceed those of the most myopic globes, which Fuchs, in his investigations on this subject, was able to obtain.

Microscopic Appearances.—The cornea in all its layers is thin; at its edges are numerous new vessels; sclera and

conjunctiva are much atrophied ; the anterior chamber is deep, and its angle wide. Schlemm's canal has disappeared, and the spaces of Fontana, though persisting, are partially filled up with cell infiltration. Iris and ciliary muscle are abnormally thin, and their veins wide and with very fine walls ; the arteries, on the other hand, show thickening of the coats and diminution of calibre ; the lens and its capsule are normal. Complete degeneration of the choroid, retina, and optic nerve has taken place. Careful investigation of the *venæ vorticosæ* was undertaken with a view to determine, if possible, the influence exerted on them by the pressure of the oblique muscles. It was found that each main trunk, just before piercing the sclerotic was dilated, and at this point there was in every case a limited detachment of the choroid from the sclera, bridged across, as seen under the microscope, by two more or less pigmented bands, which proved to be cross-sections of the walls of the pouch-like dilatations above referred to. Over a space corresponding to these choroidal detachments the sclerotic was, in several instances, extremely thin and slightly bulged out, as if the pressure of the retarded blood had caused a small staphylo-matous projection. These phenomena are most marked in the upper veins, which, from their relation to the superior oblique, must have been compressed by its action, and the authors lay stress on this point as of especial interest, and as indicating the real cause, in the two last cases at least, of increased tension.

CASE V.—(Right eye from the same patient.) This globe, which is soft and atrophied, measures much less in all directions than the left. In the line of action of the superior oblique there is a deep groove, which, differing from that in the other eye, persists even when the muscle is relaxed. The condition of the iris is worthy of note ; on one side it has been bodily torn from its normal situation, and the whole membrane, pushed forwards, has re-attached itself to the posterior surface of the cornea, in an even line distant 2 to 2.5 mm. from the corneo-scleral junction ; the uveal pigment layer shows a gap corresponding to the interval between the old and new points of insertion ; on the other

side the iris retains its normal attachment, but for a distance of 5 mm. forwards is intimately adherent to the posterior corneal surface, and then turns at a sharp angle towards the centre of the globe. Descemet's membrane, which can be seen dividing the two structures, is ragged and much broken up. In connection with the posterior pigment layer of the iris, there are a few wart-like, almost structureless masses projecting backwards, in many of which hyaline degeneration is observed. No trace remains either of Schlemm's canal or the spaces of Fontana. The venæ vorticosæ, as compared with Case IV., are not so indicative of retarded blood flow, but in two instances the limited choroidal detachment is present, and in the others the veins are dilated in their immediately sub-scleral portions. For the rest, the microscopic characters of this globe are very similar to those of the left eye already detailed.

NORMAN M. MACLEHOSE.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Thursday, October 17th, 1889.

J. HUGHLINGS JACKSON, M.D., F.R.S., President, in the Chair.

The session was opened by an introductory address by the President. We give here a brief abstract of this address, which will be found printed *in extenso*, in the *British Medical Journal*, October 26th, 1889.

Dr. Jackson said :—"No professional honour could be more pleasant to me than is the Presidency of the Ophthalmological Society. There is no department of medicine which has greater attractions for me than ophthalmology has. It was the first subject I specially worked at after my student life, and I still think what I said before the Medical Society in 1877, that it was 'the luckiest thing in my medical life that I began the scientific study of my profession at an ophthalmic hospital.' At an ophthalmic hospital one has the opportunity of being well disciplined in exact observation. When a physician sees how carefully and precisely ophthalmic surgeons investigate the simplest case of ocular paralysis

he is getting a lesson in exactness, and will be less likely in his own department of practice to deal in such generalities as that a patient's seizure 'had all the characters of an ordinary epileptic fit.' I suppose I must have felt myself under the kind of discipline mentioned, when I wrote about twenty-three years ago : 'Until physicians work at the muscular disorders of various convulsive seizures as carefully as ophthalmic surgeons do at paralysis of the ocular muscles, our knowledge of convulsions will not advance in an orderly way.'

"Although I do not congratulate you on your present choice, I think it a good thing that the President of this Society should sometimes be a physician. It will encourage physicians, especially young physicians, to work earnestly at the ophthalmological aspect of cases of patients under their care. By doing so they may repay part of the great debt to ophthalmology which general medicine and especially neurology is under.

"Since six cranial nerves and the sympathetic nerve supply the eyeball and its apparatus, it is evident that without a good knowledge of eye diseases, the thorough investigation of very many morbid affections of the nervous system is not to be methodically carried out. Unless the physician uses the ophthalmoscope by routine, he will often enough overlook the best evidence—and I am convinced in some cases the only evidence—of gross organic disease of the brain there is to be had ; and if, as is most often the case in a physician's practice, sight be good, he will not surmise that there is anything wrong with his patient's optic nerves, and will very likely be incredulous when some one who has looked at them tells him that there is swelling of the discs.

"I urge young physicians to study eye diseases at an ophthalmic hospital, or in the ophthalmic department of a general hospital ; this nowadays needs no urging on physicians interested in neurology. A superficial knowledge will not suffice. Without special knowledge of ophthalmology a medical man may overlook paralysis of a superior oblique muscle altogether, may not know that there is any eye trouble at all ; if so, he will misinterpret the vertigo for which his patient consults him. The physician's ophthal-

mological knowledge should be wide. A neurologist who thought only of those ocular symptoms which pertain to the nerves of the eye and their centres would be thinking too narrowly for practical purposes. Unless more widely trained in ophthalmology, he would overlook hypermetropia as a cause of headache and other nervous symptoms, and might thus treat by drugs a condition requiring spectacles for its cure. Again, the physician may, if he does use the ophthalmoscope, misinterpret what he sees if he does not know the morbid results of strain of hypermetropic eyes on the optic discs; he may erroneously consider swelling of the discs due to hypermetropia as a neuritis signifying serious brain disease, and treat the patient on that hypothesis. I infer that there is some excuse for this mistake when made by a physician, and I confess that I have made it, as I have known more than one highly accomplished ophthalmic surgeon to be, for a time at least, in doubt in such a case.

"I speak again of optic neuritis with gross organic brain disease. I suggest that cases of uniocular neuritis with tumour of one hemisphere (I have only seen three cases with necropsies) are the cases which after microscopical examination of the parts concerned, will throw most light on the process by which optic neuritis results from disease of various parts of the encephalon. The discovery of this process will be a great gain to neurology as well as ophthalmology. At present there are only hypotheses as to this process. I find that I am sometimes quoted as having concluded that optic neuritis results by vasomotor action, whereas I only said, what I still think, that that hypothesis seems to me to be the most plausible of the three hypotheses I spoke of.*

"An adequate hypothesis has to explain not the neuritis only, but some other pathological conditions, also produced by intracranial tumours. How does a tumour, say of the cerebral hemisphere, produce symptoms not explainable by its destructive action? It is well known that some patients, subject to optic neuritis, have frequent temporary losses of sight. So striking and definite a symptom demands explanation as much as do epileptiform seizures, which

* Trans. Ophth. Soc., vol. i., p. 90.

often result from the same tumour of the midcortex which produces double optic neuritis. Neither of these paroxysmal symptoms can be put down to the destructive action of the tumour. I submit that they depend on diametrically opposite changes ; that there is exalted instability of cortical grey matter, a condition induced by the tumour, probably by a local encephalitis, a condition permitting occasional sudden excessive nervous discharges. An acceptable hypothesis has to account for these two symptoms as well as for optic neuritis.

"There are other symptoms sometimes occurring along with optic neuritis, from intracranial tumour, which require explanation, and this I hope physicians will endeavour to give. It is very remarkable that many patients with optic neuritis die suddenly or rapidly, and when seemingly in fair general health. In some cases of cerebral tumour the patient may be acutely ill, with slow and unrhythmical pulse and irregular respiration, retracted belly, constipation and vomiting.

"Speaking figuratively, a cerebral tumour in producing optic neuritis is trying to make the patient blind ; in producing the other pathological conditions, those of the 'vital' symptoms, it is trying to kill him. When a patient with optic neuritis dies suddenly or rapidly, or dies in an illness with the 'vital' symptoms mentioned, the medulla oblongata as well as the optic nerves and tracts should be searched microscopically.

"I now wish particularly to mention, that, as Fagge pointed out, some patients die of cerebral tumour by rapid respiratory failure, and in such cases I cannot but think that there have been morbid changes akin to optic neuritis induced in the respiratory centres of the medulla oblongata.

"I would submit to ophthalmic surgeons the importance of minutely investigating not only well-marked epileptic and epileptiform seizures, but also slight transitory symptoms, with or without loss of consciousness, which patients with optic neuritis may have, especially when there are with them 'subjective' sensations of smell or taste. These trifling symptoms may be slight epileptic paroxysms of a very important variety ; their study when optic neuritis

exists is important with regard to localisation of changes productive of epileptic paroxysms of different kinds.

"There is no end to speaking of the integration of ophthalmological and neurological knowledge. The ophthalmic surgeon studying nystagmus is helping towards the elucidation of the nature of tremor, in which the neurologist is greatly interested. Great attention should be paid, both by ophthalmic surgeons and physicians, to the tremor in cases of Graves's disease, one of the four varieties of 'vibratile tremor' of Charcot.

"The work the ophthalmic surgeon has done on the symptomatology of cases of paralysis of ocular muscles gives the clue to the interpretation of all disorders of co-ordination in man, including writers' cramp and other occupation spasms, from negative lesions. It explains the squinting resulting from hypermetropia: I think, too, that it explains the seeming alterations in the size of objects after instillation of atropine and eserine, a thing of importance, since these alterations occur at the onset of some epileptic fits.

"In the field of the eye we are most likely to be able to trace the ascending complexity, speciality, etc., in the evolution of movements from the ocular muscles to their representation in most complex movements in the highest motor centres, that is in the physical bases of visual ideas.

"Much valuable material has been accumulated for the study of the evolution of ocular movements by numerous observers. We have clinical observations on ocular paralyses from disease of (1) nerve trunks, (2) lowest motor ocular centres, and (3) still higher centres ('motor region' of the cerebral cortex), and I hope we shall have such observations of ocular paralyses from lesions of (4) motor centres still higher—the highest motor centres, the physical basis of visual and other mental states. I have considered this subject in the Bowman Lecture (1885). There is no task I would rather accomplish than this, for by doing it we should do very much towards showing that the organ of mind is sensori-motor, as is the rest of the nervous system. We should thus place the study of epilepsy proper and insanity on a realistic basis.

"Physicians should try to help ophthalmology by bringing

forward cases little likely to come under the notice of ophthalmic surgeons. I also think aural surgeons could bring before us cases of great ophthalmological interest. Speaking of otology, I admit that a knowledge of this department of medicine, as well as of ophthalmology, is of vast importance to the neurologist. I regret very much that I did not years ago pay as close an attention to otology as I did to ophthalmology. Let young neurologists take warning, so that they may not afterwards have like regrets.

"I have illustrated the relation of ophthalmology to general medicine by its bearing on neurology; it has, of course, much wider relations. I can best conclude this address by adopting the words with which Dr. James Anderson ends a paper*: 'It seems to me the best and most hopeful feature of ophthalmology that it has relations closer or more remote with every branch of medicine and surgery—indeed, with almost every branch of science.'"

On the Pathology of Trachoma and the Relation of this Condition to the other Forms of Conjunctival Inflammation.—This paper by Dr. Thomas Reid, of Glasgow, was presented by Mr. Brailey. The author regards the occurrence of groups of lymphoid cells at varying depths in the sub-epithelial layer as the essential part of trachoma. These may be ill defined (lymph heaps) or more distinctly bounded (lymph follicles), though never possessing a perfectly defined limiting capsule; and their lymphoid elements are pervaded and supported by a very delicate stroma. Generally there is some infiltration of lymphoid cells around them which may extend from one group to the next. The origin of these groups of cells is not a matter of absolute certainty, but the author is inclined with Michel to regard them as the dilated ends of the lymphatics of the conjunctiva. These lymphoid groups lead to changes in the epithelial layer, the deeper stratum of which may become œdematous and vacuolated, so that individual cells are often extended into a stellate form. At a later stage, many of the cells may become distended and their nuclei pressed to one side, so that the characteristic appearance of goblet cells is presented. These

* *Ophthalmic Review*, Feb.—April, 1889.

may discharge their contents, leaving their walls standing and their nuclei attached to their floor, so that, after the throwing off of the condensed superficial epithelial layer, a matter of not uncommon occurrence, the remains of the goblet cells constitute a series of irregular papilliform elevations characteristic of true forms of dry catarrh. Another important change, the development of mucous follicles, may take place in connection with the goblet cells. When the lymphoid groups, instead of being absorbed, have increased considerably in size, each one, or a small group of them, is apt to constitute a marked elevation of the conjunctiva, separated on each side from its neighbours by a deep depression. The layer of goblet cells occupying these depressions is frequently folded in so as to form a small pouch; this may be much enlarged, so as to constitute a rounded mucous follicle, which communicates by a short duct with the conjunctival surface. These mucous follicles are usually developed between the lymph follicles; but occasionally one and even several small mucous follicles can be seen occupying the centre of a single lymph follicle. Though usually flask-like, they are sometimes more tubular in form, presumably before the discharge of their individual cells, and the consequent accumulation of their contents. Though the lymph heaps or follicles may disappear by absorption, presumably by escape into the lymphatics, they perhaps more often discharge themselves externally by thinning and destruction of the overlying epithelium. There is always to be noted a tendency to softening and degeneration of their central part, as indicated by less definite structure and more feeble capacity for staining. Finally they may, instead of disappearing, become invaded by blood-vessels, and gradually converted into a dense connected tissue, which, situated in the ridge-like or papilliform elevations above alluded to, forms the grey gristly granulations characteristic of the advanced stages of severe trachoma. Careful examinations for bacilli have led to negative results, though the author is disposed to regard the implication of the cornea as a secondary infective process. In follicular conjunctivitis the author finds similar lymphoid groups and mucous follicles; moreover, he has determined, by microscopical examinations,

that the grey gristly granulations may be reached in the later stages of this disease ; consequently, he regards the two affections as essentially one, though he recognises that the vast majority of cases of so-called follicular conjunctivitis may be distinguished clinically from trachoma in that they do not tend to the development of the grey gristly cicatricial tissue. In some advanced cases of purulent ophthalmia he has found lymph follicles, and also in some cases of long-standing apparently simple conjunctival hyperæmia. The essence of purulent and catarrhal conjunctivitis, and also of conjunctival hyperæmia, appears to be a vascular congestion which may lead to a secondary lymphatic congestion, and the consequent formation of lymph heaps and follicles, whereas trachoma and follicular conjunctivitis are from the outset essentially affections of the lymph follicles. This will account for the occurrence of mixed forms, as in Egyptian ophthalmia, and for the occasional occurrence of one-sided trachoma as a sequence to long-standing conjunctivitis of other forms. In conclusion, the author does not connect the lymph follicles or mucous glands with any of those glandular structures which are rarely found in the normal conjunctiva.—The paper was illustrated by microscopic preparations in the forms of photographs and magic lantern slides.

Keratitis from Paralysis of Fifth Nerve.—Notes of this case by Mr. W. E. Cant were read by the Secretary. The patient, a lad, aged 16, attended at the British Ophthalmic Hospital, Jerusalem, on July 17, 1888, with complete paralysis of the left fifth nerve. The left eye showed some general injection, and the cornea was diffusely hazy. A history was obtained of an injury by a reaping hook two or three weeks previously, and a doctor who saw the lad two days after the blow had been inflicted, found him in a semi-conscious state. There was then a small penetrating wound in the squamous portion of the left temporal bone, about an inch above the insertion of the auricle ; into this wound a probe could be passed to a depth of rather more than one inch. When seen again on July 22nd, the left cornea was quite opaque, of a milky white colour ; there was much general congestion of the eye. He was admitted

to the hospital. During the next three weeks the condition of the left cornea became rather worse, and marginal ulceration occurred. The paralysis of the fifth nerve remained complete. The patient then left the hospital, and was not seen again for four months. When he returned the left cornea had partially recovered, but was still generally hazy. The function of the fifth nerve, both muscular and sensory branches, had been regained, but to only a limited degree. Mr. Cant thought the case had been one of direct injury to the whole fifth nerve within the skull, between the brain and the Gasserian ganglion, or at the latter.

Card Specimens.—The following living and card specimens were exhibited :—Mr. Lang : (1) Congenital Coloboma of Iris, with Notch in Lens ; (2) Two Cases of Congenital Coloboma of Iris and Choroid ; (3) Cystic Formation in Coloboma of Iris.—Mr. Quarry Silcock : (1) Exostosis of Frontal Sinus ; (2) Double Proptosis, (?) modified Graves's Disease ; (3) Probable Sarcomatous Infiltration of Tenon's Capsule.—Dr. Abercrombie and Mr. Marcus Gunn : A Case of Exophthalmos in a Child with Audible Intracranial Bruit.

THE RELATIVE IMPORTANCE OF THE DIFFERENT FORMS OF REFRACTIVE AND MUSCULAR ERROR IN THE CAUSATION OF HEADACHE.

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The following paper is based upon the records of two hundred and fifteen cases, occurring in private practice, in which note has been made of the refractive and muscular condition of the eyes and of the presence or absence of headaches. Its main object is to show the relative frequency of the occurrence of headache in the different forms of refractive and muscular error.

Headache is perhaps the most common nervous symptom attributed to ocular mal-adjustment, but is far from being the only one, and in many of the cases in which headaches are noted as being absent other nervous symptoms were present; dizziness coming next in frequency to headache, other symptoms being nausea upon use of the eyes, twitching of the eyelids, slight general choreic movements, rapid exhaustion upon exertion of any kind, and insomnia.

Therefore the percentages in the following statistics do not fully represent the frequency of nervous symptoms in the cases upon which they are based.

In referring to muscular errors the terms suggested by Dr. Geo. T. Stevens will be used (Knapp's Archives, vol. xvi. No. 2, and other journals). These terms are certainly convenient, and appear to describe accurately

the conditions they are meant to represent. The following are the terms with their definitions :—

Orthophoria : a tending of the visual lines in parallelism.

Heterophoria : a tending of these lines in some other way.

Esophoria : a tending of the visual lines inwards.

Exophoria : a tending of the visual lines outwards.

Hyperphoria : a tending of one visual line above the other.

Hyperesophoria : a tending of one visual line up and in.

Hyperexophoria : a tending of one visual line up and out.

The determination of the presence of orthophoria or of the particular form of heterophoria, in other words of the position of rest, was made with Stevens's phorometer, described and figured in Knapp's Archives, vol. xvii., No. 2, the object being a candle flame at the distance of twenty feet. The results obtained by the use of this instrument are as nearly accurate as possible. An absolutely vertical or horizontal position of the prisms is insured, and if error occur, it is due to faulty position of the head of the patient. When there is no esophoria or exophoria, the head may be tilted far over to one or the other side without producing any change in the relative heights of the two images seen on looking through the horizontal prisms used in testing for hyperphoria. When, however, esophoria or exophoria is present, tilting the head *considerably* to one or the other side produces a *slight* alteration in the level of the images, varying in degree with the amount of lateral deviation. In the case of esophoria, the image corresponding with the lower eye falls ; in exophoria, the image corresponding with the lower eye rises. The results of testing cases of hyperesophoria and hyperexophoria from day to day have been so uniform that I am convinced that the error made

possible by such a degree of tilting of the head as would be likely to pass unnoticed is infinitesimal.

The presence of vertical deviations appears to have no influence upon the estimation of lateral deviations. So far as caution is necessary, therefore, it has to be exercised in seeing that the head of the patient is in a vertical position during the test for hyperphoria, in those cases in which lateral deviation is present. Perhaps the parallelism of the horizontal bar of the phorometer with the line running through the pupils (*before* the prisms are placed in position) is as accurate a guide as can be obtained. It seems doubtful whether the error due to faulty position of the head can be eliminated entirely and with certainty.

Table No. I. gives an analysis of the 215 cases on the basis of refraction and muscular equilibrium. A

TABLE I.

	Emmetropia.	Hypermetropia.			Myopia.			Mixed Astig.	Anisometropia.	Total.
		Simple.	Simple Astig.	Compound Astig.	Simple.	Simple Astig.	Compound Astig.			
Orthophoria.....	6	9	13	9	1	9	6	1	3	57
Exophoria	1	2	3	1	2	3	1	1	1	15
Esophoria.....	7	12	19	18	2	4	14	1	0	77
Hyperphoria	4	3	4	8	2	3	9	3	3	39
Hyperexophoria ...	1	0	1	1	1	2	4	0	0	10
Hyperesophoria ...	1	1	2	4	0	4	4	1	0	17
Totals ...	20	27	42	41	8	25	38	7	7	215

number of cases which have been placed in the columns of hypermetropic and myopic astigmatism might have been placed in the anisometropia column, but, as the kind of refractive error seemed a more important factor

in the causation of the symptoms than the difference in the degree of error in the two eyes, they were placed in the former.

Of the above 215 cases headache occurred in 160.

The next table gives an analysis of these cases on the same basis as the above.

TABLE II.

	Emmetropia.	Hypermetropia.			Myopia.			Mixed Astig.	Anisometropia.	Totals.
		Simple.	Simple Astig.	Compound Astig.	Simple.	Simple Astig.	Compound Astig.			
Orthophoria.....	1	7	7	6	0	4	1	1	1	28
Exophoria	1	2	3	1	1	3	1	1	1	14
Esophoria	5	10	15	16	1	3	9	0	0	59
Hyperphoria	3	2	4	8	2	3	9	3	1	35
Hyperexophoria ...	1	0	1	1	0	2	4	0	0	9
Hyperesophoria ...	1	1	2	3	0	4	3	1	0	15
Totals....	12	22	32	35	4	19	27	6	3	160

In only one case out of the 160 in which headache was complained of were emmetropia and orthophoria both present.

In 20 cases of emmetropia, headache was present in 12, or 60 %.

" 6 " " em. with orthophoria " " " " 1 " 17 "

" 14 " " em. " heterophoria " " " " 11 " 78½ "

On the other hand,

In 57 cases of orthophoria, headache was present in 28, or 49 %.

" 6 " " orthophoria with em. " " " " 1 " 17 "

" 51 " " " " ametr. " " " " 27 " 53 "

A comparison of these percentages indicates that heterophoria is more apt to produce headache than ametropia.

The small number of the cases upon which these per-

centages are based makes the results suggestive rather than conclusive.

The following tables seem to indicate that astigmatism is the most *common* factor in the production of headache, although percentages given later on will tend to show that it is less *certain* to produce headache than some forms of heterophoria.

Thus, astigmatism of all kinds was present in $71\frac{1}{3}\%$ of the total number of cases examined, and its percentage was still higher, $74\frac{1}{3}$, amongst those cases in which headache was a symptom; and of the total number (153) of astigmatics, 119, or $77\frac{1}{3}\%$, suffered from headaches.

On the other hand, hyperphoria was present in $30\frac{3}{8}\%$ of the total number of cases examined, and in 37% of the cases in which headache was a symptom; but of the total number (66) in which hyperphoria was present, 59, or $88\frac{3}{8}\%$, suffered from headache.

Table III. shows the frequency of the occurrence of emmetropia, and the various forms of ametropia, in the total number of cases examined on the one hand, and in those cases in which headache was a symptom on the other.

TABLE III.

	Of total No. of cases (215).	Of 160 cases in which headache was a symptom.
Emmetropia	20 cases, or 9%	12 cases, or $7\frac{1}{2}\%$
Ametropia	195 " " 91%	148 " " $92\frac{1}{2}\%$
Simple Hypermetropia.....	27 " " $12\frac{1}{2}\%$	22 " " 14%
Hy. Astig. ..	83 " " $38\frac{1}{2}\%$	67 " " 42%
Simple Myopia	8 " " 4%	4 " " $2\frac{1}{2}\%$
Myopic Astig. .	63 " " 29%	46 " " 29%
Mixed Astigmatism	7 " " $3\frac{1}{2}\%$	6 " " 4%
Astigmatism	153 " " 71%	119 " " $74\frac{1}{2}\%$

In passing from the first to the second half of the table, the percentages of em. and my. fall; all the rest rise, or, as in the case of myopic astigmatism, remain the same.

Table IV. shows the frequency of the occurrence of orthophoria and the various forms of heterophoria in the same two groups.

TABLE IV.

	Of total no. of cases (215)		Of 160 cases in which headache was a symptom.	
Orthophoria present in	57 cases	26½ %	28 cases	17½ %
Heterophoria "	158 "	73½ "	132 "	82½ "
Exophoria "	15 "	7 "	14 "	8½ "
Esophoria "	77 "	35½ "	59 "	37 "
Hyperphoria "	39 "	18 "	34 "	21½ "
Hyperexophoria "	10 "	4½ "	9 "	5½ "
Hyperesophoria "	17 "	8 "	16 "	10 "

It will be seen that the percentage of orthophoria decidedly falls in the headache cases, and that there is a fairly uniform rise in all forms of heterophoria.

In Table III. all cases in which astigmatism of the degree of 0.25 D. has been present have been counted astigmatics. Although astigmatism of this low degree has rarely much influence upon visual acuteness, its

TABLE V.

Form of Refraction.	Total No. of cases.	No. of cases in which headache occurred.	Percentage.
Emmetropia	20	12	60
Ametropia	195	148	70½
Simple Hypermetropia	27	22	81½
Simple Hy. Astigmatism	42	32	76
Comp. Hy. Astigmatism	41	35	85
Simple Myopia	8	4	50
Simple My. Astigmatism	25	19	76
Comp. My. Astigmatism	38	27	71
Mixed Astigmatism	7	6	85
Anisometropia	7	3	43
Astigmatism	153	119	77½

power to produce troublesome asthenopia and headaches of the severest kind is, I believe, great, and underestimated by many ophthalmologists.

Table V. shows the actual number of cases of emmetropia and of each variety of ametropia, and the percentages of headache among them.

According to this table the tendency to headache in ametropia rises to its highest point in compound hypermetropic astigmatism ; it will be seen to rise still higher when some form of heterophoria is added. The tendency to headache seems to be lowest in simple myopia, so far as can be ascertained from the number of cases at command. The results of Tables III. and V. are confirmatory of one another: the one shows great infrequency of simple myopia in cases of headache ; the other, a lower percentage of headaches in cases of myopia than in any other form of refraction, not excluding emmetropia.

Table VI. shows the actual number of cases of orthophoria and each form of heterophoria, and the number and percentages (of cases) in which headache was present among them.

TABLE VI.

Form of Muscular error.	Total No. of cases.	No. of cases in which headache occurred	Percentage.
Orthophoria	57	28	49
Heterophoria.....	168	132	79½
Exophoria	15	14	93
Esophoria	77	59	76½
Hyperphoria	39	35	90
Hyperexophoria	10	9	90
Hyperesophoria	17	15	88

As regards exophoria, I believe the tendency to headache indicated by the above figures to be greatly exaggerated—a result due probably to the small number of cases of this anomaly, of which my notes are sufficiently complete for use. Dr. Stevens is strongly

of the opinion that exophoria is the least disturbing of all forms of heterophoria. Omitting this group from consideration, it will be seen that about 90 % of all the cases in which hyperphoria, with or without lateral deviation, is present, suffer from headaches.

Hyperphoria seems then to be somewhat more certain to produce headache than any other single form of refractive or muscular error.

We now pass to the effects produced by the combination of the different forms of refractive error with various forms of muscular error.

Table VII. shows the number of cases of each combination examined, and the number and percentage of those affected with headache.

(In this table the terms myopia and hypermetropia include all forms of myopic and hypermetropic refraction respectively.)

TABLE VII.

Refractive and Muscular Conditions.	Total No. of cases.	No. in which headache occurred.	Percentage.
Hy. + Orthophoria	31	20	64½
Hy. + Heterophoria	79	69	85
Hy. + Hyperphoria	15	14	93
Hy. + { Hyperphoria..... Hyperexophoria	24	22	92
Hy. Astig. + all forms of hyperphoria	20	19	95
Hy. + Esophoria	49	41	83½
Hy. + Exophoria	6	6	100
My. + Orthophoria	16	5	31
My. + Heterophoria	55	45	81½
My. + Hyperphoria	14	14	100
My. + Hyperphoria (all forms).....	29	27	93
My. + Esophoria	20	13	65
My. + Exophoria	6	5	83
My. Astig. + Hyperphoria (all forms)	26	25	96
Mixed Astig. + Hyperphoria.....	4	4	100
Astig. (all forms) + Orthophoria...	38	19	50
Astig. (all forms) + Esophoria	56	43	77
Astig. (all forms) + Simple hyperphoria	27	27	100
Astig. (all forms) + Exophoria	9	9	100

The high percentage of headaches in exophoria in

this table may again be regarded as misleading, for the reasons stated above.

The effect of the addition of the different forms of heterophoria to astigmatism is certainly very striking, raising as it does the percentage of cases with headache in this form of refractive error from 50 to 100 per cent. Hyperphoria is again seen to be the most disturbing of all forms of heterophoria, and uniformly so in all kinds of refraction; raising the percentage of headaches in hypermetropia from 64 to 93 %/, in myopia from 31 to 100 %/, and in emmetropia from 16 (probably too high a percentage) to 83 %/.

Of all combinations, that of astigmatism of all kinds with simple hyperphoria seems to be the most potent in the production of headaches, there being no difference in this respect between the various forms of astigmatism; and that of myopia with esophoria the least. The latter fact is perhaps explained by the supposition that for the purpose of *near* work, esophoria may be less of a disadvantage in myopia than in other forms of ametropia, as it tends to restore the normal relation between accommodation and convergence, whereas distant objects are too blurred to necessitate a very exact blending of the two images. There may indeed be actual diplopia for distant objects, and yet the patient may be unable to recognise it except with the aid of a red glass.

A review of the cases and the tables in which they have been arranged suggests the following conclusions:—

1. That headaches are frequently the result of ametropia and heterophoria.
2. That ametropia is a more *common* factor in the production of headaches than heterophoria.
3. That heterophoria is more *certain* to produce headache than ametropia.
4. That astigmatism is the most common and powerful refractive factor in the production of headaches; and of the different forms of astigmatism,

compound hypermetropic astigmatism the most important in this regard.

5. That hyperphoria, either simple or complicated, with eso- or exophoria is a common form of heterophoria.

6. That hyperphoria is decidedly more certain to produce headache than any other form of heterophoria or ametropia.

7. That a combination of hyperphoria with astigmatism is the most powerful cause of ocular headache.

THE POSITION OF REST AS A CAUSE OF STRABISMUS.

BY F. W. MARLOW, M.D., M.R.C.S. ENG.

"Is the position of rest the cause of strabismus?"—

Under this title Dr. E. J. Gardiner, of Chicago, has discussed in the Arch. of Ophthal., vol. xvi. 1, Stilling's theory regarding the origin of strabismus. The latter has attempted to show, in a somewhat elaborate paper, in vol. xv., No. 3, of the same Archives, that "the cause of squint is not hypermetropia, but the position of rest usually associated with hypermetropia, viz., convergence." That this proposition is untenable is shown by Gardiner on general theoretical grounds.

The determination of the position of rest in the above 215 cases, and of the distribution of its different varieties amongst the various forms of refraction, furnishes evidence decidedly adverse to the correctness of Stilling's theory.

The following table shows the relative frequency of the different forms of the position of rest in 20 cases of emmetropia, 71 of myopic refraction, and 110 of

hypermetropic refraction, as shown by Stevens's phorometer :—

Form of position of rest.	In 20 cases of Emmetropia.	In 71 cases of Myopia.	In 110 cases of Hypermetropia.
Parallelism	6 cases 30 %	16 cases 22½ %	31 cases 28 %
Divergence	1 " 5 "	6 " 8½ "	6 " 5½ "
Convergence	7 " 35 "	20 " 29 "	49 " 44½ "
Deviation of one eye upwards	4 " 20 "	14 " 20 "	15 " 14 "
Deviation of one eye upwards & outwards	1 " 5 "	7 " 10 "	2 " 2 "
Deviation of one eye upwards & inwards	1 " 5 "	8 " 11 "	7 " 6 "

If we add to the cases of simple lateral deviation, those in which there is also a vertical deviation, we find

A <i>Divergent</i> position of rest in 10 % of cases of Emmetropia.		18½	"	Myopia.
"	"	7½	"	Hypermetropia.
and A <i>Convergent</i>	"	40	"	Emmetropia.
"	"	40	"	Myopia.
"	"	51	"	Hypermetropia.

As in cases of convergent strabismus, the convergence is commonly an indication of the presence of hypermetropia, so also is a convergent position of rest frequently symptomatic of the same refractive error, the latent convergence (or esophoria) diminishing in degree, or totally disappearing after the use of atropine or the correction of the hypermetropia.

The cases in the above table were mostly examined without atropine, and probably represent too high a percentage of latent convergence in hypermetropia, and perhaps also in emmetropia. It will be fair to assume that atropine and glasses would have reduced the frequency of latent convergence in hypermetropia from 51 to 45 % or even less.

Now, upon Stilling's theory, the relative frequency of the different forms of strabismus ought to approximate to the relative frequency of the different forms of the

position of rest. The examination of the above 215 cases tends to show that convergent squint ought to occur more frequently than any other form of squint ; next in order should come vertical squint, then squint upwards and inwards or outwards ; and finally the purely divergent form. The rarity of vertical squint is a strong argument alone against the correctness of the theory.

Again, the results found by myself differ radically from Stilling's. In 116 cases of myopia he found divergence 73 times, or in 63 % ; but in 71 cases examined by myself divergence was found in 13 cases (including those complicated with vertical deviation), or in barely 19 %. In his cases of myopia, divergence is the commonest form of the position of rest ; in mine, the rarest.

Again, vertical deviation, simple and complicated with lateral deviation, is present as the position of rest in 40 % of my cases of myopia, but is unmentioned throughout his whole paper. It is difficult to believe that this is due to the fact that it was not present in any of the cases. Probably it would have been found had it been carefully looked for.

A convergent position of rest occurs with almost equal frequency in emmetropia, hypermetropia and myopia. On Stilling's theory we ought to find emmetropia and myopia almost as frequently present in cases of convergent strabismus as hypermetropia, which is notoriously not the case.

Of the cases of strabismus occurring in myopia, the divergent form ought to occur in 60 % according to Stilling's theory and table, which is certainly understating the case ; but according to my table, and the same theory, we should find 24 % only of the divergent form against 51 % of the convergent and 25 % of the vertical form !

There is, indeed, so much difference between Stilling's results and my own that the thought arises

that the number of individual cases examined is insufficient to decide the relative frequency and distribution of the different forms of the position of rest in the various kinds of ametropia.

The observations made are, however, sufficient to suggest very strongly that the position of rest is "*not* the cause of strabismus."

L. BELLARMINOW (St. Petersburg). Intermittent stimulation of Retina. *V. Graefe's Archiv.*, XXXV., 1, 25.

The experiments described in this paper were undertaken to establish the difference between the periphery and the centre of the retina for intermittent stimuli, and to ascertain what relation this difference might have to the colour and intensity of the illumination, the size and form of the test object, and the position of its image upon the retina. The investigation is essentially an extension of that of Exner (*vide* O.R., v. 357), and the results are in general harmony with his. Spectroscopic colours were used in determining the effect of colour.

The results are given in the form of tables and curves, which establish the following points. For white light the sensitiveness of the periphery is greater than that of the centre of the retina, but on increasing the intensity of the light this difference decreases until at a certain intensity it vanishes, and the centre and periphery exhibit the same sensitiveness. (As in Exner's experiments, this sensitiveness is measured by the number of stimuli that can be repeated in a given time without producing the effect of a continuous sensation.) Precisely similar results were found when testing with spectral colours, red, yellow, green, blue and violet. As the intensity increased, the difference between the peripheral and central sensitiveness diminished, and with high intensities (especially in yellow and green) the centre became even more sensitive than the periphery.

This fact that intermittent stimuli which produce a con-

tinuous sensation at the centre of the retina can still be perceived as separate by the periphery is susceptible of three explanations : (1) the positive after-image at the centre of the retina lasts longer than that at the periphery, their intensities being equal ; (2) or the intensity of the peripheral positive after-image is greater than that of the central one ; or (3) both statements are correct. The third hypothesis is the correct one, observations by numerous competent authorities tending to prove that positive after-images are more intense at the periphery than at the centre, and endure a shorter time. The fact that the usual phenomenon is reversed when light of high intensity is used can be explained by the well-known rapidity with which the periphery of the retina becomes fatigued.

The tendency of the periphery of the retina to record intermittent stimuli as movements in the field of vision which has been observed by Exner, can be accounted for by want of attention on the part of the central nervous system. Precisely similar erroneous impressions can be made by stimuli applied to the centre of the retina if the attention is not fixed on what is taking place.

Bellarminow's conclusions are :—(1) With weak and moderate illumination greater frequency of stimulation is necessary to produce a continuous impression at the periphery than at the centre, and also at the nasal side of the retina than at the temporal. (2) This difference is shown by all colours employed, but is most marked towards the blue and violet end of the spectrum. (3) The reverse phenomenon occurs with high intensities, probably owing to the rapidly developed fatigue of the retinal periphery. (4) The size of the test object has no important relation to this phenomenon. (5) The form of the object is also unimportant. (6) The number of stimuli necessary to produce a continuous impression increases with the diminution of the angular velocity of the disc used. (7) The intensity of positive after-images at the periphery is greater, and their durability less than that of those at the centre. (8) Perception of intermittent stimuli as movements is an error of consciousness not peculiar to the periphery, but observed at the centre also if attention is absent. (9) This greater

sensitiveness of the periphery is of importance to the animal world in the struggle for existence, as has been stated by Exner.

J. B. S.

Th. TREITEL (Königsburg).—The Light Sense of the Periphery of the Retina. *V. Graefe's Archiv.* XXXV. 1, p. 50.

Treitel commences by a brief *résumé* of the experiments of former observers, first of whom, Mile, stated that objects in indirect vision are darker as well as less distinct—a conclusion refuted by Aubert, who tested in three ways: (1) by incandescent platinum wire, (2) by squares of white paper in daylight, and (3) squares of snuffed glass illuminated from behind in darkness. Aubert considers his experiments not altogether faultless, and points out, in addition, the fact that certain zones of our retina must during all time receive only about half as much light as the macula, and therefore weaker stimuli on the periphery produce the same effect as stronger at the centre.

Rupp tested by the shadow of a thread thrown by a candle on translucent paper, another candle being behind the paper. He found it necessary to remove the second candle further away in indirect than in direct vision; *i.e.*, to make the shadow more intense. Masson's disc corroborated this observation, and he follows Mile in concluding that objects appear darker in peripheral vision.

Exner (O.R., v. 357), using Masson's disc, found that in peripheral vision a greater difference in the brightness of objects was necessary to let them be perceived than in direct vision, but would not draw a conclusion as to the peripheral light sense, because the defective localising power of indirect vision might vitiate the argument. Treitel, however, considers the conclusion justified that the peripheral light sense is reduced.

Dobrowolsky and Gaine, using Masson's disc, found also the perception of differences in illumination (*Unterschiedsempfindlichkeit*) less acute at the periphery, and Chodin obtained the same result.

Charpentier, however, found the peripheral light sense almost everywhere as acute as the central. His experiments were made in the dark with a photometer of his own construction.

Schadow found that light must possess 2.28 times the intensity to excite the retina 60° to the inner side of the fovea than is necessary at the fovea itself, but at 30° from the fovea the necessary intensity is less than that at the fovea in the proportion of 1 : 1.38. This result is found in what he calls indirect fixation ; but if direct fixation is used, he found the sensitiveness of the retina less at 30° than at the centre.

Butz found the retina at 30° more sensitive than at the centre, and only very little less sensitive than the centre at 60° .

Bull found a regular decrease in sensitiveness to differences of illumination from the centre to the periphery.

The uncertain conclusions of these former experimenters induced Treitel to test the question again, with the following results, so far as the nasal side of his retina in the horizontal meridian is concerned. In daylight he found a regular decrease in the light sense from the centre towards the periphery. The experiments were performed with a specially constructed perimeter, containing as test object a 10 mm. square opening, through which could be seen a rotating disc (Masson's). In order to perceive this opening illuminated, a certain breadth in the white sector of the rotating disc is necessary. Centrally fixed, this breadth was 0.5° , at 2° from the fovea 1° , at $5^\circ = 3^\circ$, at $10^\circ = 4^\circ$, at $20^\circ = 12^\circ$, at $40^\circ = 13^\circ$, and at $60^\circ = 25^\circ$ on December 15th, 1887. The results varied considerably on different days, and the average of twelve observations is the following :—At the fovea, the minimum breadth of the white sector = 0.5° , at $2^\circ = 0.75^\circ$, at $5^\circ = 2.5^\circ$, at $10^\circ = 4.5^\circ$, at $20^\circ = 9.5^\circ$, at $40^\circ = 10.3^\circ$, at $60^\circ = 19.5^\circ$, and at $70^\circ = 43.5^\circ$.

Treitel further tested the peripheral light sense in diminished light—the eye being adapted thereto by some half hour's experience. He found a certain difference in the relations of the central and peripheral light sense in daylight and in diminished light. In daylight the light sense at from 30° to 40° is about ten times less than at the fovea, but in

diminished light it is only about one-half less, this change of relation being essentially at the expense of the central light sense.

The results obtained by Treitel agree with those of Rupp, Exner, Dobrowolsky, Chodin, and Bull, and are opposed to those of Aubert, Charpentier, Schadow, and Butz. It is seen, however, that the former observers made their experiments in daylight or good illumination, the latter in diminished light, and no regard has been paid by any of them except Bull to the influence of diminished light upon the light sense of the retinal periphery. Bull explains the relative superiority of the peripheral light sense over the central in diminished light by the yellow colour of the macula, an explanation rejected by Treitel, who brings in the difference in the peripheral and central power of adaptation to account for the discrepancies in the various observations. (*Vide* O.R., v. p. 172, and vii., p. 46.) It is a fact, in consequence of the relatively slow adaptation of the fovea, that the peripheral light sense appears better than the central in diminished light. It has never yet been fully tested to what degree the visual power of the fovea increases in prolonged adaptation. Two hours have been shown to be insufficient, and during that period adaptation has been shown to be continuously proceeding. Our present knowledge does not enable us to assert that the peripheral light sense is relatively higher than the central in diminished light for the above reason.

A similar observation applies to the colour senses. Treitel considers that the experiments of Rühlmann and Butz, who found an increase in the colour sense peripherally, can be accounted for by the slower adaptation of the central portion of the retina.

J. B. S.

A. A. KRYOUKOFF (Moscow). Remarks on Glaucoma; Statistics of 1,430 Cases. *Vestnik Ophthalmologii*, July—October, 1889.

This paper was read at the third meeting of the Russian Medical Society. In the 12 years January 1st, 1876, to January 1st, 1888, the author treated 48,828 cases of eye disease, 1,430 of which were cases of glaucoma. This gives a percentage of 2.92. For the different years the number of glaucoma cases varied between 2.47% and 4.09%. This proportion is considerably higher than that met with by ophthalmic surgeons in Western Europe as a rule. Adding together the published statistics of 14 different Russian oculists Kryoukoff found that 3,923 cases of glaucoma were met with amongst 215,378 patients, that is 1.8%. Various authors have stated that glaucoma is more frequent amongst Slavs than amongst the inhabitants of Western Europe, and have ascribed this to various causes: greater rigidity of the Russian sclera, greater frequency of hypermetropia in Russia, etc. Kryoukoff believes that there are not sufficient grounds for supposing that the disease is really more frequent in Russia. He ascribes the larger proportion met with to the fact that there are few ophthalmic centres in comparison to the size and population of the country, and that consequently a larger proportion of serious cases come to the existing clinics than would otherwise be the case. In support of this he points out that whereas the proportion of cases of optic atrophy to other cases is given by Hirschberg, in Berlin at 0.97%, the proportion at his own clinic is 1.36%, that found by Adamük 1.64%, and by Chodin 2.3%. Further, of his glaucoma cases 41.3% came from outside Moscow. In Spain and Italy, too, the proportion of glaucoma cases has been found to be high at some clinics; no doubt from the same cause. The state of refraction found in the cases tested gave: E. in 28%; M. in 28.78%; H. in 43.18%. He remarks consequently, that obviously hypermetropia is

the most frequent state of refraction occurring along with glaucoma. Of 10,732 consecutive patients tested for their refraction, however, E. was found in 27.58%; M. in 29.32%, and H. in 43.09%. He therefore concludes that the frequency of hypermetropia in glaucoma is no greater than its relative frequency altogether. Next as to the frequency of the disease at different ages we have the following table:—

18-25 years, 10 cases.		56-60 years, 345 cases.	
26-30	" 5 "	61-65	" 281 "
31-35	" 6 "	66-70	" 208 "
36-40	" 34 "	71-75	" 103 "
41-45	" 58 "	76-80	" 49 "
46-50	" 124 "	81-85	" 13 "
51-55	" 189 "	86-90	" 4 "

Again, as to sex: 24,217 of all the patients were men, 24,611 women. Of the glaucoma cases 828 were men, 602 women, or 57.9% men and 42.1% women. Adamük's statistics showed also a preponderance of men, whilst on the other hand those of Arlt and Donders gave the opposite. Kryoukoff therefore concludes that the disease is about equally frequent in either sex, perhaps, if anything, rather more frequent in men.

The other points referred to in Kryoukoff's paper are of minor statistical interest.

G. A. BERRY.

[We find no express statement that the author excluded all forms of secondary glaucoma, or that the age of the patient was reckoned from the commencement of the glaucoma, and not from the time when the case was noted. The figures, therefore, will not bear strict comparison with the statistics of 1,000 cases published in the Transactions of the Ophthalmological Society of the United Kingdom for 1886.—ED.]

SCHMIDT-RIMPLER (Marburg).—On the Origin of Serous Iris-Cysts. *Arch. f. Ophthalm. XXXV. I.*

The theories which have hitherto been advanced in explanation of the origin of iris-cysts usually start with the assumption of a perforation of the cornea, usually by wound, or, at least, of a contusion of the eye-ball whereby the iris tissue is injured. As regards serous cysts, the irritation of a foreign body was thought by Sattler to give rise to exudation into the substance of the iris leading to some separation of its fibres and the formation of a cavity. No good explanation was given for the lining endothelium of a cyst formed in this way. Other writers have considered these iris-cysts to be sacculations of the anterior chamber due to a detachment by injury of the endothelial layer lining the cornea, ligamentum pectinatum and iris. This explanation is insufficient for many of the cases. Wecker ascribed some of these serous cysts to occlusion and dilatation of the crypts normally present in the iris, by adhesions to the cornea. He explained their lining endothelium as derived from the posterior pigment cells of the iris, but this, Sattler, on pathological grounds, would not accept. Recently, however, Stölting and Gonella have found pigmented cells in some cyst-lining epithelium, in a case following wound of the cornea. They thought the endothelium in their specimen was derived from that on the posterior corneal surface.

The origin of cysts of the iris in eyes which have not suffered from traumatic or other perforation of cornea is even less clearly understood, indeed doubt has been expressed as to the occurrence of these so-called "spontaneous" cystic formations. Schröter has lately made some reliable observations on this point (*A. f. O. XXXI. 3*), and Schmidt-Rimpler now publishes notes of a case which seems to throw some light on the pathogenesis of these cysts.

His patient was a woman æt. 46, who for about three years had suffered from relapsing superficial ulceration of the left cornea. Iritis had also occurred, but there was no

evidence of perforation and no history of injury. When she came under observation in July, 1884, there was visible on the lower part of the left iris a black circular spot the size of a hemp seed, which looked like a hole in the tissue, but through which no light could be reflected. There appeared to be a slight elevation of the iris tissue around this black patch. The patient was not seen again for six months, when she returned with the lower part of the left iris occupied by a cyst which was in close contact with the cornea peripherally, and covered about one-quarter of the whole circumference of the iris. The pupillary border was not included in the cyst, the anterior wall of which appeared to be composed of atrophied, partly pigmented iris. Its contents were transparent, and through them the dull grey posterior cyst wall could be seen by oblique illumination: $V. = \frac{1}{4}$.

In May, 1886, fifteen months later, the cyst wall adjoining the corneal margin had become opaque over an area about 3 mm. in size, but above this it was still translucent. This wall appeared to consist of iris tissue, into which it merged at the margins. The cyst measured 5 mm. vertically and 7 mm. transversely; $V. =$ counting fingers at 1.5 m. An attempt was made to remove the cyst, but during the operation the contents escaped. A small piece of the anterior wall which was drawn out was examined fresh and showed large celled pavement epithelium attached to a hyaline membrane. Nothing more was done at the time, and the patient left the hospital. The cyst re-formed, but did not attain the same size as before. Six months later the cyst wall and a portion of iris were removed by operation. The result of the microscopic examination was briefly as follows:—The anterior and posterior walls of the cyst were formed by the iris, which was split into two layers near its root, the front portion projecting forwards nearly at right angles to the plane of the iris (*see* Pl. iv. in the original). No definite basement membrane could be distinguished. The inner surface of this wall was lined by a layer of endothelial cells, which extended along the portion of the posterior wall which had been removed. In the iris tissue forming the cyst walls were deep pits lined with

several rows of endothelial cells. The outer surface of that part of the iris which formed the front wall of the cyst showed no increase of its anterior endothelial layer. In the portions of iris adjacent to the cyst there was noticeable atrophy of the posterior pigment layer. This Schmidt-Rimpler attributed to pressure exerted by the cyst.

This case is noteworthy because the growth of the cyst had been observed from the beginning, and injury to the eye could be excluded almost with certainty. No adhesions between iris and cornea or lens capsule were present. Microscopic examination proved that the cyst wall consisted of altered iris tissue. The author considers that such a cyst originates in the closure of one of the crypts always present in the iris. These crypts, according to Fuchs, dip into the iris tissue as deeply as the position of the vessels, and from the latter the lymph streams pass through them into the anterior chamber. These lymph streams have been demonstrated by experiments with fluorescein injection in rabbits (Schick). Anatomical researches, and especially the examination of the anterior surface of the iris by Zehender's binocular lens, have shown that these pits in the iris are frequently bridged over, in part by bands, or completely by a thin membrane. In one instance Fuchs observed (microscopically) a fine non-nucleated membrane closing the opening of a crypt.

It seems legitimate to assume that such a membrane might become thickened as a result of disease, and thus the anterior outlet of the crypt be occluded; the same pathological conditions might block any lateral communications between the crypt in question and adjoining ones, and the lymph would then be unable to escape into the aqueous. The gradual accumulation of this secretion would soon lead to dilatation of the cavity so formed, and its encroachment on the surrounding iris tissue. The endothelial lining membrane of the cyst Schmidt-Rimpler thinks is derived from the endothelium which dips into the crypts from the anterior surface of the iris. Under the irritation of the enclosed lymph, growth of this normally existing endothelial layer occurs; and this lining membrane is thickest on the posterior wall of the cyst.

These "idiopathic" iris-cysts may, in the author's opinion, be looked upon as lymphatic retention cysts, a view which the case he has recorded entirely supports.

J. B. L.

A. E. PRINCE (Jacksonville). Expression in the Treatment of Trachoma. *Proceedings of the Illinois State Medical Society, May, 1889.*

The treatment of trachoma by squeezing out the contents of the follicles, originally proposed by Mandelstamm and a little later by Hotz, has received, according to the author of this paper, less attention than it deserves. The difficulty of squeezing the follicles efficiently without the help of an instrument expressly designed for the purpose has probably hindered its more general application.

During the stage of acute inflammation, squeezing is contra-indicated, but when this is beginning to subside and the follicles stand out more prominently from the mucous surface, it may be applied with great advantage.

Many cases of trachoma end in spontaneous recovery, but with a loss of much of the mucous membrane, which undergoes cicatricial contraction. The treatment by caustics expedites recovery, but is apt in like manner to cause shrinking of the tissues. The same disadvantage, and in greater degree, attaches to the excision of the conjunctival cul-de-sac. By mechanically squeezing the area in which the follicles lie, the surface is ruptured. The follicular contents are extruded, and healing follows without loss of tissue.

Encouraged by two years' experience of this method, but finding a difficulty in applying it with the necessary com-



pleteness, Prince devised the expression forceps shown in the figure. Their shape renders accessible every point of the conjunctival surface, and the extremities are so rounded as to avoid laceration of the mucous membrane. With this

instrument he has been able to cure chronic cases in which the follicles were inaccessible by other means.

The hæmorrhage produced is generally slight, and probably beneficial. The pain may be much diminished by the use of cocaine—more effectually by the use of bromide of ethyl, which, when properly administered, secures in from sixty to thirty seconds an anæsthesia which lasts from one to two minutes, and seldom leaves a headache behind.

Squeezing is not to be considered a substitute for other treatment, but a valuable adjunct.

P. S.

C. S. BULL (New York). The Value of Electro-Therapeutics in Lesions of the Optic Nerve.
New York Medical Journal, April 27, 1889, p. 457.

In this paper Bull briefly reviews the statements which have been advanced from time to time by various observers concerning the use of electricity in diseases of the eye. He then sums up his own experience. Up to within the last two years he was in the habit of employing the galvanic current in every case of optic nerve lesion among his private patients, and in many cases of hospital practice. The results were so negative, and in many cases so unfavourable, that he has latterly entirely abandoned galvanism as a method of treatment in these diseases. From his own experience and that of others, as recorded in ophthalmological literature, he draws the following conclusions :—

1. In optic neuritis from whatever cause, and in papillitis or choked disc from intracranial tumours, galvanism, whether direct through the closed lids and eyeball, or indirect through the cervical sympathetic, has no real value and should be abandoned.
2. In optic neuritis, due to hereditary or congenital tendency, galvanization of the sympathetic nerve in the neck is of no value.
3. In simple, uncomplicated atrophy of the optic nerve, the use of the constant current cannot be said to promise either positive improvement or an arrest of the degenerative

process. In most of the cases in which an improvement of vision has been noted it proved to be merely temporary ; and the same may be said of the apparent retardation of the degenerative process.

4. In cases of injury to the optic nerve, galvanism has not proved of the slightest permanent value.

5. In traumatic anæsthesia of the optic nerve and retina, uncomplicated by any laceration of nerve tissue or rupture of nerve fibres, galvanism carefully and persistently applied has been known to produce a rapid and permanent improvement of vision, when applied directly to the closed lids, and the current passed through the eyeball.

P. S.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Thursday, November 14th, 1889.

J. HUGHLINGS JACKSON, M.D., F.R.S., President, in the Chair.

Recovery from Hemianopsia, with Subsequent Necropsy.

—Mr. Doyne read notes of this case. The patient, an old man, had a sudden attack of right homonymous hemianopsia ; the fields of vision recovered in the course of a fortnight, but subsequently a quadrant of the opposite (left) side of each field was lost. Death occurred some weeks later from cerebral apoplexy. At the necropsy, in addition to the extensive extravasation which caused death, there were found symmetrical lesions (softening) on both sides of the brain in the cortex of the occipital lobe, one evidently more recent than the other.

Homonymous Hemianopsia: Recovery: Subsequent Death and Necropsy.—Dr. James Anderson recorded the case of a warehouseman, aged 41, sent to him by Mr. Waren Tay on March 28th, 1889, complaining of failure of vision for six weeks with severe frontal headache, and during the previous week much failure of memory and mental depression. He had been losing flesh for four months, had had no fit, no

vomiting, and no loss of sensation or of motor power so far as he knew ; but during the previous week he had had two severe falls from inability to see to his right side, and his speech and general manner had altered in character. The family and personal history threw no light on his trouble. He had eight healthy children, and denied all history of venereal disease. He was much depressed about himself, looked thin and anxious, and had some difficulty occasionally in finding words, but there was no loss of gross motor power or of general or special sensation except as regards vision. His gait and reflexes were normal, and the heart, lungs, and kidneys apparently healthy. The ocular and pupillary movements were normal, and with the exception of an old nebula on the left cornea there was no pathological change in either eye, the discs and fundi being quite healthy. He could read J. 1 with each eye separately, but only with difficulty. The right halves of both visual fields were lost up to but not including the line through the fixation point ; the left halves were of average extent. From the symptoms, Dr. Anderson concluded that the patient had an intracranial growth, probably malignant, and situated in the medulla of the left occipital lobe, also that a hæmorrhage had taken place into the tumour at the beginning of the previous week. He was admitted on March 29th into the London Hospital, and prescribed full doses of sod. iod. and liq. hydrarg. perchlorid. Perimeter charts taken on March 31st by Dr. Charles Wilson showed right homonymous hemianopsia with some contraction of the remaining left half of the right visual field. Within a fortnight the headache and mental symptoms had much subsided, and the perimeter chart of April 18th showed only slight contraction of the right halves of the visual fields. Mr. Grimshaw, the clinical clerk, who watched the fields from day to day, believed that the right halves varied considerably, being smaller on days when there was severe headache. The patient left hospital on May 18th, was seized with severe headache and vomiting on May 22nd, and on May 29th had a transient attack of left hemiplegia, which had quite passed off when he was readmitted into the hospital on June 20th. The lower quadrants of the right halves of both visual fields were at this date deficient nearly

up to the vertical line through the fixation point, especially on the left side, but otherwise the fields were of good extent, and vision was still J. 2 with the right and J. 3 with the left eye; the fundi were normal. Rapid mental deterioration ensued, and he became extremely troublesome; vision seemed to be more defective, but he would not allow his eyes to be examined. On August 9th he was sent to Banstead Asylum, where he continued in a demented state, and died on October 1st. The necropsy made by Dr. Claye Shaw showed a recent blood clot in the posterior cornu of the left lateral ventricle of the brain, with hæmorrhage and softening in the tissue external to this, involving the whole of the angular gyrus up to its surface, the central part of the area being occupied by a walnut-sized cavity containing straw-coloured fluid. The angular gyrus was replaced by gliomatous tissue. The rest of the brain and the other organs of the body seemed to be healthy, and there was no evident explanation of the temporary left hemiplegia observed four months before death. The improvement of the patient under antisyphilitic treatment and the subsequent transient left hemiplegia caused some doubt as to the early diagnosis, which was, however, confirmed by the necropsy. Dr. Anderson stated that he had not previously met with a case of recovery from hemianopsia, that in cases of hemianæsthesia with hemianopsia, for example, from a vascular lesion in the area of the posterior cerebral artery, even when the former group of symptoms disappeared, the latter, very generally at least, persisted. Hæmorrhage had in this case pretty certainly taken place into the tumour at the date of the patient's coming under observation, and a second hæmorrhage into it had been the immediate cause of death. The case was interesting in relation to modern views of visual localisation.

The President said that the subject of the two papers just read concerned the very important question of cerebral localisation. He mentioned two cases which had been under his own care; in one hemianopsia was associated with hemianæsthesia, in the other there was much mental confusion, but neither hemiplegia nor hemianæsthesia; he also referred to the frequent association of right hemianopsia and word blindness.

Dr. Hill Griffith inquired if Dr. Anderson's patient had exhibited the hemiopic pupillary reaction.

Dr. S. J. Taylor spoke of a case of hemianopsia in which the fields of vision regained their normal limits. Death occurred shortly after, but no necropsy was obtained.

Dr. Stephen Mackenzie thought that the two cases now reported pointed rather to the hemianopsia being due to pressure exerted by hæmorrhage on the parts of the brain concerned in vision. The fluctuations in the fields of vision during recovery lent support to that view rather than to the supposition that the function was taken on by some other part of the brain. He thought that the symptoms might be explained by vascular changes in propinquity to the visual centres and the fluctuations in the field by variations in blood-pressure.

Mr. Lang referred to two cases of recovery from hemianopsia, and supported Dr. Mackenzie's views.

In reply, Dr. Anderson said that in his case the pupil acted well to light thrown on to either half of the retina. In Mr. Doyne's case it was certain that the two areas of softening in the brain were of different dates; the older patch being in the site of the hæmorrhage which occurred at the time of onset of the hemianopsia; the more recent patch marking the lesion which caused the subsequent loss of a quadrant of the fields in their opposite halves.

On the Size of the Cornea in Relation to Age, Sex, Refraction, and Primary Glaucoma.—Mr. Priestley Smith gave an account of certain facts obtained by measurement of the cornea in a large number of human eyes. The inquiry had been undertaken to test the truth of a suggestion he had previously made to the Society, namely, that small corneas are specially connected with a liability to glaucoma in its primary form. The measurements were made by means of a simple keratometer devised for the purpose.* The horizontal diameter only was measured, and the nearest half-millimètre was noted. The eyes examined were chiefly those of private and hospital patients with refractive errors or slight ailments such as could not invalidate the result. A number of healthy

* See *Ophthalm. Review*, November, 1886.

eyes of old people in a workhouse and an almshouse were also examined. A number of persons affected with primary glaucoma were examined in like manner.

The normal cornea :—250 males and 250 females were examined, giving a total of 1,000 eyes, representing all life periods from 5 to 90 years of age. Age, sex, and refraction were noted in every case. Analysis gave the following results : general average, 11·6 millimètres, size variable in individual cases, but not often greater than 12 or less than 11 millimètres ; number greater than 12, 34 per 1,000, namely, 12·5, 30 eyes ; 13, 2 eyes, 13·5, 2 eyes ; number less than 11, 17 per 1,000, namely, 10·5 in every instance. Stature and size of head were not systematically noted, but there were many larger corneas in smaller persons, and smaller corneas in larger persons, and therefore no general proportional relation existed in this respect. Classification according to age gave the following results : average, between 5 and 10 years, 11·67 ; between 10 and 20, the same ; between 20 and 40, nearly the same ; after 40, rather smaller, but the difference not large enough to be very positively asserted. The cornea, then—or at least its visible part—attains its full diameter very early in life, many years before the rest of the body completes its growth. Comparison of other data relating to size and weight of different parts during intra- and extra-uterine life (quoted from Vierordt and Manz) shows that the development of the cornea is precocious in relation to that of the eye as a whole ; that of the eye in relation to that of the brain ; that of the brain to that of the whole body. In advanced life the height of the body and the weight of the brain diminish ; the apparent slight diminution of the cornea at the same period may perhaps represent an actual shrinkage due to the same slackening of nutrition, but this is merely a suggestion. Classification according to sex showed a very slight but probably a real difference in each life period, the cornea of the male being on the average about one-tenth of a millimètre the larger. Classification according to refraction showed the unexpected fact that the size of the cornea bears no relation to the refraction, being no smaller in hypermetropia, no larger in myopia, than in emmetropia. This was further proved by

comparson of 90 highly hypermetropic with 90 highly myopic eyes. The size of the cornea is determined early in life, and is not affected by the greater or smaller extension of the posterior hemisphere which may occur later. The cornea is full grown at 5, or earlier ; at any rate it does not add one-tenth of a millimètre to its diameter after this age. The lens, a near neighbour of the cornea, is full grown only at the other end of life, and, if the life be a long one, adds at least 2 millimètres to its diameter after the cornea has ceased to enlarge. This involves a gradual change in the mutual relations of the two which may have important consequences.

The cornea in primary glaucoma : Sixty-nine persons having primary glaucoma in one or both eyes were examined in like manner. Number of glaucomatous eyes, 99 ; healthy, 32 ; some of the patients had lost one eye ; the statistics comprise the whole. Average, 11.27 ; maximum, 12 ; minimum, 10. Number of corneas measuring less than 11 millimètres (spoken of as "small corneas"), 34, that is, 26 per cent. Comparing the glaucoma group with the same life periods in the healthy group, the small corneas formed 26 per cent. of the one, 4 per cent. of the other. More important even than this, among the 1,000 eyes of healthy persons there was not one cornea so small as 10 millimètres, while there were 9 such in the much smaller glaucoma group. A definite relation between the small cornea and primary glaucoma was thus proved. The explanation lay, in the speaker's opinion, in an undue proximity between the lens and the surrounding structures. But this explanation raised certain questions which called for answer. Is the smallness of the cornea a consequence of the glaucoma ? The changes occurring at the angle of the anterior chamber might be supposed to opacify the corneal margin. This idea was disproved by the fact that in 7 of the glaucoma patients both corneas were small, while only one eye was glaucomatous ; in one of these the other eye was attacked later. This showed that the smallness of the cornea precedes the glaucoma, and is not caused by it. Is the small cornea small from youth up, or does it become so in later life ? There are grounds for holding the latter view ; small corneas

are much commoner in the second half of life ; but they are not entirely wanting in early life, and may at this early age be associated with glaucoma (witness Mr. Hartridge's case shown to the Society on March 11th, 1886). When the cornea is small, is the globe small in proportion ? As shown already, the refraction gives no answer to this question ; it can only be determined by a sufficient number of measurements of cornea and globe. In a recent case of the speaker's what appeared to be a faultless iridectomy, on a glaucomatous eye with a 10 millimètres cornea, was followed by no relief of the glaucoma. On excision some months later the eye proved to be exceptionally small, like the cornea, namely, 21 millimètres antero-posteriorly by 21 vertically by 22 horizontally. The refraction of this eye had been 5 D of hypermetropia. Lastly, is the small cornea associated with a proportionately small lens ? If so, the speaker's explanation of the matter falls to the ground. In the case described the failure of the operation had arisen through obstruction of the wound, which could not have been made more peripherally, by the margin of the lens. Other specimens in the speaker's possession showed the same result. In the important case published by Hocquard and Masselon—microphthalmos with glaucoma—the eye resembled the one above described, but in an exaggerated form, and the lens was found to be “much too large for the eye.” The structural conditions in question—large lens, small cornea—were not necessarily present in primary glaucoma, for the disease could occur in the absence of both ; but they were conditions which either singly or together give to certain eyes a greater than ordinary predisposition to it.

Treatment of Symblepharon.—Professor Snellen (Utrecht) described an operation for the cure of symblepharon, which had given him very satisfactory results. His plan was to thoroughly free the adherent lid, leaving any conjunctiva which might be present attached to the globe. A thin flap of skin of the required size was then dissected from the cheek, having a narrow pedicle close to the border of the lid near the outer canthus ; a buttonhole being made beneath this flap from the inner surface of the eyelid, the flap was drawn through and attached to the raw surface of the

lid. The conditions in this situation were peculiarly favourable for plastic operations, and Professor Snellen had been much pleased with the vitality shown by the flap. This operation had also proved of value in enlarging a socket for the reception of an artificial eye.

A New Operation for Ptosis.—Professor Snellen had recently adopted the following procedure for cases of ptosis : A ligature was passed from without inwards through the entire thickness of the lid at the upper edge of the tarsus ; the lid was then everted and the needle passed outwards through all the structures except the skin at a point near the upper limit of the conjunctival sac, and made to perforate the skin near the original puncture. The ends of the ligature were then tied over beads on the surface of the lid. Three such ligatures were employed disposed rather towards the nasal side, on account of the position of the levator.

On the Treatment of Episcleritis.—Professor Snellen recommended the injection, once or twice a week, of a 1 to 5,000 solution of corrosive sublimate beneath the swollen and thickened conjunctiva and episcleral tissue. The eye was cocainised and the solution injected by means of a Pravaz' syringe. By this means he had obtained good results in a few cases of very intractable episcleritis.

Specimens.—The following living and card specimens were exhibited : Mr. Silcock : (1) Anomalous Position of the Ciliary Processes conjoined with shrunken Lens and (?) Persistent Capsulo-pupillary Membrane ; (2) Micro-cornea in a highly Myopic Eye.—Mr. Kelsall : (1) Aniridia ; (2) Syphilitic Neuro-retinitis.—Mr. Tatham Thompson : (1) Photograph of Unilateral Facial Hypertrophy, with Hypertrophic Ptosis ; (2) Model illustrating Strabismus, Strabotomy and Muscular Advancement.

